Adirondack Park State Campground Steward

Terrestrial Invasive Species Survey & Management Report

Summer 2018

A collaborative initiative among the New York State Department of Environmental Conservation, The Nature Conservancy's Adirondack Park Invasive Plant Program, and the State University of New York College of Environmental Science and Forestry

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TABLE OF CONTENTS

Year in Review

State campgrounds and trailheads are high priorities for terrestrial invasive species surveillance and management due to their high levels of human disturbance and recreational traffic. They are often the first locations where new invasive species are introduced and detected. Once infestations become established, they can serve as source populations for spread into areas of higher conservation value. Since 2012, the Adirondack Park Invasive Plant Program, in collaboration with the New York State Department of Environmental Conservation (DEC) and the State University of New York College of Environmental Science and Forestry (SUNY ESF), has deployed an Invasive Species Campground Steward to quickly detect and address new infestations. Over 4,000 acres of DEC-administered lands have been surveyed by these stewards to date, with over 1,000 infestations mapped and 660 infestations managed. As of 2018, over 530 historically managed infestations no longer have invasive species present or have been locally eradicated after three consecutive years of documented absence.

During the 2018 field season, 37 New York State administered campgrounds in the Adirondack Partnership for Regional Invasive Species Management (PRISM) were surveyed and/or managed for terrestrial invasive plant species. Management was performed at 29 campgrounds, while eight locations were found to be free of target terrestrial invasive species. Infestations of garlic mustard (*Alliaria petiolata*), purple loosestrife (*Lythrum salicaria*), knotweed spp. (*Reynoutria spp.*), common reed grass (*Phragmites australis*), wild parsnip (*Pastinaca satvia*), winged burning bush (*Euonymous alatus*), Oriental bittersweet (*Celastrus orbiculatus*), Japanese barberry (*Berberis thunbergii*), yellow iris (*Iris pseudacorus*), bush honeysuckle (*Lonicera spp.*), autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*) and Norway maple (*Acer platanoides*) were mapped using GPS and The Nature Conservancy's Invasive Plant Mobile Monitoring System (IPMMS). When feasible, infestations were managed using mechanical control techniques.

Seven years of results indicate significant opportunity for successful control and eradication of many species at Adirondack campgrounds. Since the program's inception, garlic mustard abundance at DEC campgrounds has declined by approximately 90%, while purple loosestrife has declined by 83%. With continued annual management, there is a high likelihood for many infestations to be significantly reduced in abundance or locally eradicated. However, there are notable exceptions at select campgrounds where particularly large infestations are unlikely to be eradicated, even with sustained allocation of resources. Nevertheless, most infestations can still be effectively suppressed to minimize impacts to the environment, economy, and human health.

Progress achieved by previous management efforts was set back in 2010 and 2011 when state seasonal capacity was limited, and invasive plants were left unmanaged; reinforcing the importance of sustained monitoring and management. The majority of knotweed spp. and common reed infestations are not managed by the Invasive Species Campground Steward, since effective control of these species usually requires the application of herbicides. However, these species do not exhibit a significant presence at the campgrounds and could likely be locally eradicated with sustained herbicide treatments. Chemical control for select infestations was initiated by the Adirondack Park Invasive Plant Program's (APIPP) terrestrial response team in 2018.

Many campground employees were unaware that their facility was infested by an invasive plant species and were not familiar with invasive plant identification and management practices. To rectify this challenge, it would be beneficial to offer trainings in invasive species identification and management to campground staff at the beginning of the season. Ideally, this would occur at all campgrounds, but is especially important at those currently invaded or located near heavily-infested areas. This is also important for campgrounds that are located adjacent to areas of high conservation value such as the Forest Preserve.

Introduction

Overview

Beginning in the summer of 2006, the DEC supported a seasonal Invasive Species Specialist position to implement annual invasive plant inventories and management at state campgrounds in the Adirondack Park. Since state campgrounds are intensive use areas that receive high levels of recreational traffic, they are more susceptible to the inadvertent introduction of invasive species. Once a campground becomes infested, it can serve as a source for invasive species spread into nearby areas of high conservation value. The spread of invasive plants can result from vegetative growth, seed dispersal, root and stem fragmentation, etc. Movement of contaminated soils or equipment, use of non-native plants in landscaping, and transport of seeds on clothing and equipment are likely vectors of invasive species introduction at state campgrounds. As a result, APIPP and DEC have identified state campgrounds as priority areas for invasive species surveillance and management.

The DEC Invasive Species Specialist performed invasive plant surveys and control each field season from 2006 through 2009. In 2010, funding for the position was unavailable, resulting in a lapse of data collection and management. Progress that had been made in controlling garlic mustard and purple loosestrife was set back as plants regrew and infestations went unmanaged. In 2011, APIPP initiated limited management, collecting data for and controlling several infestations at high priority campgrounds. Since 2012, DEC, APIPP, and SUNY ESF have advanced a seasonal internship to administer an Invasive Species Campground Steward (Steward) to revitalize invasive plant surveillance and management at state campgrounds within the Adirondack Park. Supervision and project oversight for the Steward have been provided by APIPP's Terrestrial Invasive Species Project Coordinator. APIPP's terrestrial rapid response teams, members of the Student Conservation Association (SCA), and other volunteers also assist he Steward with survey and management activities.

The following report summarizes terrestrial invasive species surveillance and management activities performed by the Steward at DEC campgrounds and recreation areas in the Adirondack Park during the 2018 field season.

Standard Monitoring and Management Procedures for Target Invasive Species

The Steward was equipped with The Nature Conservancy's IPMMS to document the location and extent of terrestrial invasive species infestations located at state campgrounds throughout the PRISM. Data was collected using an iPad and Bluetooth GPS antenna, and uploaded daily to TNC's server for processing and storage. At the end of each season, all invasive species observation data is uploaded to New York's Invasive Species Database (iMapInvasives). Campgrounds are divided into six working circles based upon their location within the region. The Steward visited one or more campgrounds per day depending on the size of the facility and number of infestations present. In general, management activities started in the southern portion of the PRISM and progressed northward to coincide with the latitudinal advance of the growing season.

Some species were targeted for management, while others were only surveyed due to logistical constraints or lack of effective control measures. The table below provides a summary of species the Steward was trained to detect and their designation as management or survey targets.

Species	Priority
Garlic mustard	Management target
Purple loosestrife	Management target
Wild parsnip	Management target
Yellow iris	Management target
Oriental bittersweet	Management target, if isolated
Bush honeysuckle	Management target, if isolated
Japanese barberry	Management target, if isolated
Multiflora rose	Management target, if isolated
Autumn olive	Management target, if isolated
Winged burning bush	Management target, if isolated
Norway maple	Survey only
Phragmites	Survey only
Knotweed spp.	Survey only
Balsam woolly adelgid	Survey only
Emerald ash borer	Survey only
Hemlock woolly adelgid	Survey only

Garlic mustard – Second-year plants were pulled up by the root and placed in thick contractor garbage bags. The bagged materials were transported to TNC's headquarters in Keene Valley where they were solarized until the contents had liquefied and no viable plant material remained. At the end of the season, these bags were disposed of at the local transfer station.

Purple loosestrife – Plants were pulled or dug up to remove as much of the root system as possible. Plants were placed in thick contractor garbage bags and transported to TNC's headquarters in Keene Valley where they were solarized until the contents had liquefied and no viable plant material remained. At the end of the season, these bags were disposed of at the local transfer station. Plants with evidence of damage from the biocontrol *Gallerucella* beetle were not managed mechanically as the beetle requires purple loosestrife as habitat and food source to establish and spread.

Wild parsnip – Plants were pulled up by the root and placed in thick contractor garbage bags. The bagged materials were transported to TNC's headquarters in Keene Valley where they were solarized until the contents had liquefied and no viable plant material remained. At the end of the season, these bags were disposed of at the local transfer station. NOTE: Protective clothing (long sleeves and gloves, at a minimum) was worn when managing this species, as the sap of this plant is phototoxic and can cause phytophotodermatitis upon contact with exposed skin.

Bush honeysuckle, Japanese barberry, multiflora rose, autumn olive, and winged burning bush – The presence of these invasives was documented, but infestations were managed only when plants were sparsely distributed throughout the campground. These species are of lower priority for management because of their widespread distribution in the Adirondacks and ability to be transported long distances by birds. Management of larger infestations was performed only when adequate time remained after management and inventories of other, higher priority species/infestations had been completed. To manage these species, plants were pulled up by the base to remove the entire root system. Medium-sized plants often required the use of a leverage tool. Extracted plants were hung upside down in nearby trees to dry and decompose. Large plants were left in place and noted for potential cut stump herbicide treatment by APIPP.

Yellow iris – Plants were pulled or dug up to remove as much of the root system as possible and placed in thick contractor garbage bags. Bags of plant material were transported to TNC's headquarters in Keene Valley where they were solarized until contents had liquefied and no viable plant material remained. At the end of the season, bags were disposed of at the local transfer station.

Oriental bittersweet – Small plants were pulled up by the base to remove the entire root system. In some cases, vines had to be untangled from their host before they could be completely removed. Extracted plants were hung upside down in nearby trees to dry and decompose.

Herkimer Working Circle

The Herkimer Working Circle contains two campgrounds: Alger Island and Nicks Lake. The following section provides on overview of survey and management activities for these locations during the 2018 field season.

HERKIMER WORKING CIRCLE MANAGEMENT SUMMARY			
Campground	**Invasive Plants Present**	**Total Plants Removed**	**Density of Infestations**
Alger Island	Not Inventoried in 2018		
Nicks Lake	Garlic Mustard Bush Honeysuckle	91 0	Low Moderate

* = Plant was dead/dormant and it was too late in season for effective management.

Density of Infestations:
Sparse – less than 25 plants observed across the campground
Low – 25 – 149 plants observed across the campground
Moderate – 150-500 plants observed across the campground
High – Greater than 500 plants observed across the campground
Extreme – Greater than 500 plants observed across the campground and management of the campground could not be achieved by a five-person crew in one day, or biological control measures are recommended.

Alger Island

Invasive Species Distribution and Management Overview:

This facility was not visited in 2018. Inventories were performed in 2008 and 2015 and no target invasive species were detected. Invasion risk/vulnerability is presumed low for this location due to its isolated location and comparatively low levels of use. If time and access to a boat are available, this campground should be resurveyed in 2019.

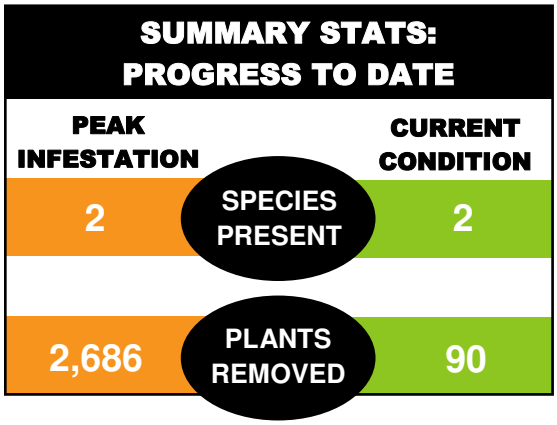
Alger Island Campground
Photo Credit: DEC

Nicks Lake

Invasive Species Distribution and Management Overview:

Bush honeysuckle is widespread throughout the campground and was not managed.

Garlic mustard was mapped and removed from sites 14, 61, 84, 104, 110, and along a foot path to the lake. The distribution and abundance of garlic mustard throughout the campground has declined significantly since intensive survey and management efforts began in 2012 (Figure 1). In total, 91 garlic mustard plants were removed from six locations within the campground. This marks a significant decrease from peak invasion levels observed in 2014 when over 2,600 plants were removed from 53 locations.



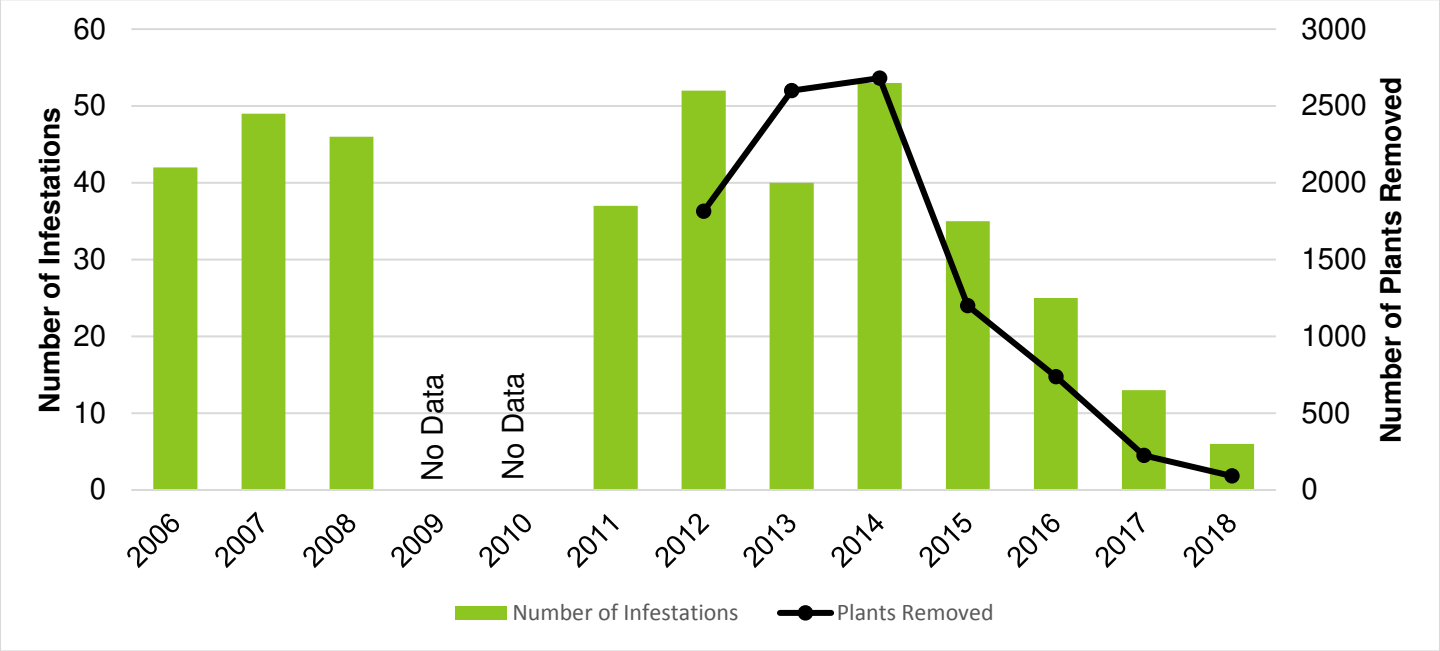


Figure 1. Garlic mustard distribution and management progress at Nicks Lake Campground.

Recommendations:

Garlic mustard should remain a top survey and management priority for this facility. Total abundance has been reduced by 97% from peak infestation levels documented in 2014. With continued control efforts, garlic mustard can likely be locally eradicated. Additional time should be allocated to survey undeveloped portions of the campground to search for potentially undetected source infestations. Bush honeysuckle is widespread throughout the campground and should be addressed only after management of higher priority species is complete. However, since this species can be spread long distances via bird dispersed seed, reintroduction is likely.

Indian Lake Working Circle

The Indian Lake Working Circle contains eight campgrounds: Brown Tract Pond, Eighth Lake, Forked Lake, Golden Beach, Indian Lake Islands, Lewey Lake, Limekiln Lake, and Tioga Point. The following section provides an overview of survey and management activities for these locations.

INDIAN LAKE WORKING CIRCLE MANAGEMENT SUMMARY			
Campground	**Invasive Plants Present**	**Total Plants Removed**	**Infestation Density**
Brown Tract Pond	Garlic Mustard Bush Honeysuckle	31 2	Low High
Eighth Lake	Garlic Mustard Bush Honeysuckle	314 0	Moderate High
Forked Lake	Bush Honeysuckle	1	Low
Golden Beach	Garlic Mustard Bush Honeysuckle	406 0	Moderate Low
Indian Lake Islands	Not Inventoried in 2018		
Lake Durant	Wild Parsnip Bush Honeysuckle	231 0	Moderate Low
Lewey Lake	Autumn Olive Garlic Mustard Purple Loosestrife Bush Honeysuckle	1 13 8 1	Sparse Sparse Sparse Sparse
Limekiln Lake	Garlic Mustard Bush Honeysuckle	79 0	Low High
Tioga Point	Not Inventoried in 2018		

* = Plant was dead/dormant and it was too late in season for effective management.

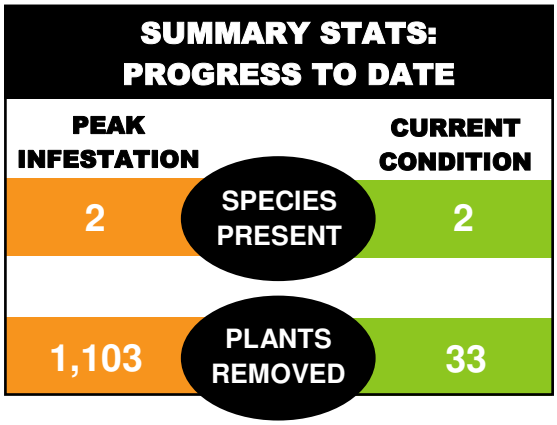
Density of Infestations:
Sparse – less than 25 plants observed across the campground
Low – 25 – 149 plants observed across the campground
Moderate – 150-500 plants observed across the campground
High – Greater than 500 plants observed across the campground
Extreme – Greater than 500 plants observed across the campground and management of the campground could not be achieved by a five-person crew in one day, or biological control measures are recommended.

Brown Tract Pond

Invasive Species Distribution and Management Overview:

Bush honeysuckle was mapped at sites 4, 17, 21, 29, 31 and 32, but can be found sporadically throughout the campground. Two plants were removed; however, additional unmanaged plants remain scattered throughout the campground.

Garlic mustard was mapped and removed from sites 30 and 74. The distribution and abundance of garlic mustard has decreased significantly since intensive survey and management efforts began in 2012 (Figure 2). In total, 31 plants were removed from two locations within the campground. This marks a significant decrease from peak invasion levels observed in 2012 when 1,100 plants were removed from nine locations.



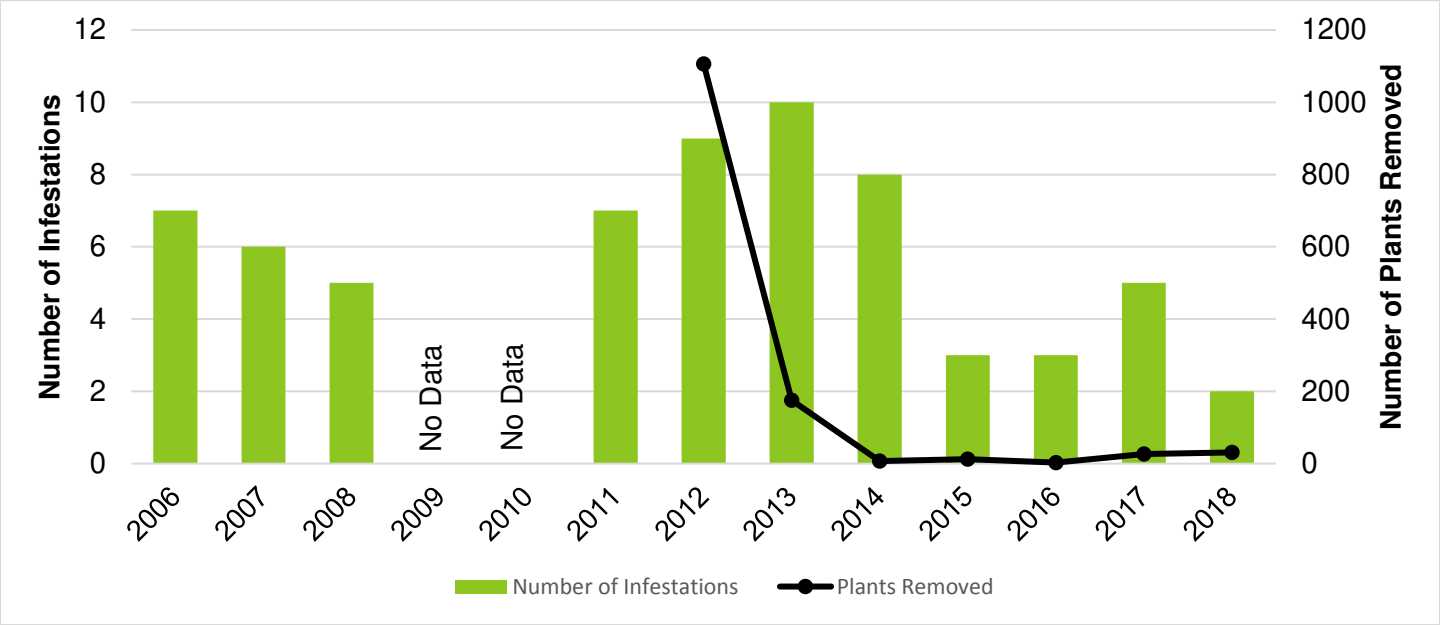


Figure 2. Garlic mustard distribution and management progress at Brown Tract Pond Campground.

Recommendations:

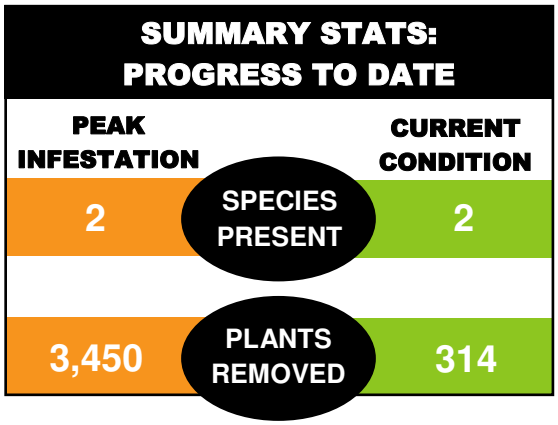
The distribution and abundance of garlic mustard has decreased by 97% from peak infestation levels observed in 2012. With continued control efforts, garlic mustard can likely be locally eradicated. Bush honeysuckle is widespread throughout the campground and should be addressed only after management of higher priority species is complete. However, since this species can be spread long distances via bird dispersed seed, reintroduction is likely. Empowering campground staff to undertake management will provide the greatest opportunity for successful suppression or containment of this species.

Eighth Lake

Invasive Species Distribution and Management Overview:

Bush honeysuckle is widespread throughout the campground and was not managed.

Garlic mustard was mapped and removed from sites 7, 8, 13, 17, 24, 30, 35, and along the road near sites 36, 37, 75, 87, 90, 95, 97, 101, 106, and 107. In total, 314 plants were removed from 17 locations within the campground. This marks a decrease from peak invasion levels observed in 2012, when 3,463 plants were removed from 44 locations (Figure 3).



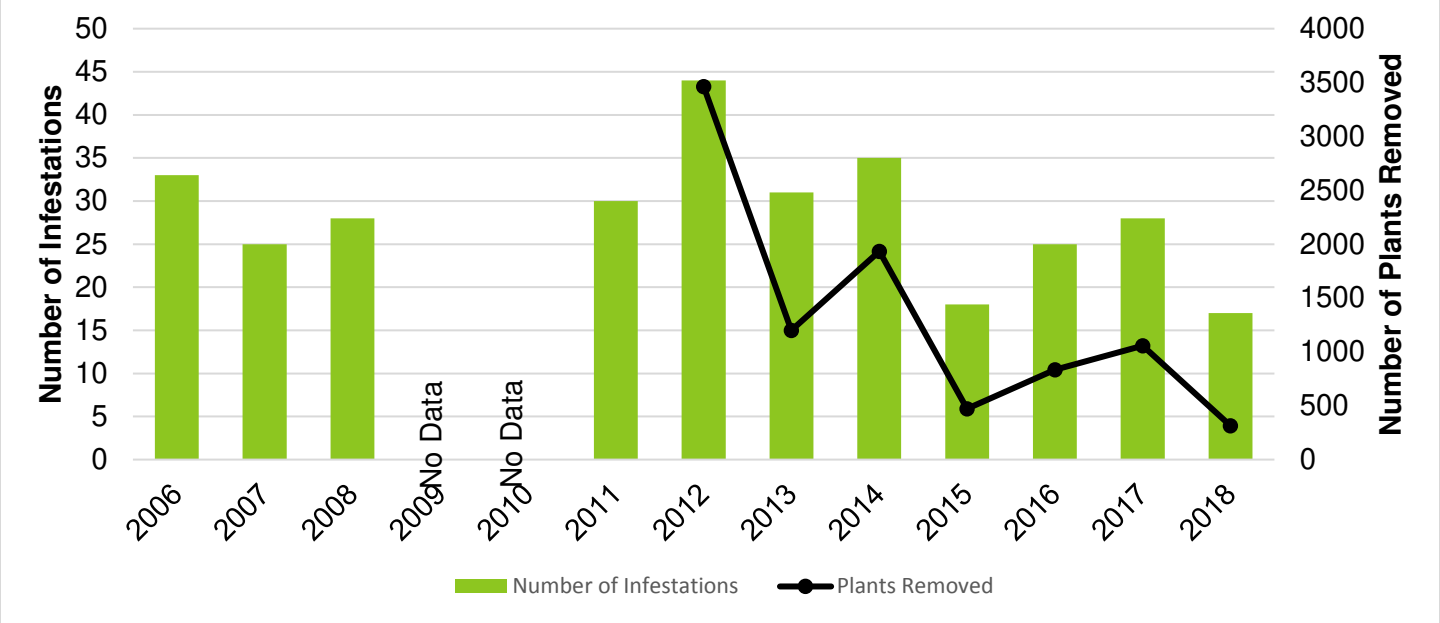


Figure 3. Garlic mustard distribution and management progress at Eighth Lake Campground.

Recommendations:

The distribution and abundance of garlic mustard has decreased by 91% since intensive management efforts began in 2012. A slight increase in garlic mustard abundance was observed from 2016 to 2017 but infestation levels have once again declined to an all-time low. Continued annual management will be necessary to maintain suppression of garlic mustard at this location. Bush honeysuckle is widespread throughout the campground and should be addressed only after management of higher priority species is complete. However, since this species can be spread long distances via bird dispersed seed, reintroduction is likely. Offering an invasive species identification and management seminar for the campground staff would be beneficial, if time and resources are available. This would increase staff's awareness of invasive plant identification and management techniques and could contribute to the success of future management efforts.

Forked Lake

Invasive Species Distribution and Management Overview:

Bush honeysuckle is found in dense clusters around the parking area and boat launch but was not managed due to the size and abundance of plants. An isolated bush honeysuckle infestation was found and removed near campsite 79.

Recommendations:

This campground should be monitored annually to remove any new/small bush honeysuckle plants and to address any new invasive species that become established. Garlic mustard is present at nearby campgrounds and should be a target for early detection survey efforts.

SUMMARY STATS: PROGRESS TO DATE

PEAK INFESTATION		CURRENT CONDITION
1	SPECIES PRESENT	1
3	PLANTS REMOVED	1

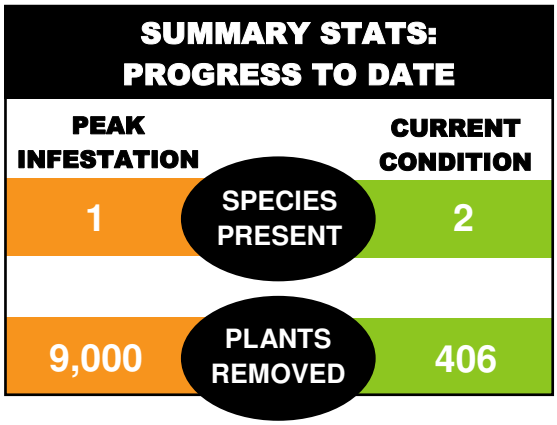
Forked Lake Campground
Photo Credit: Quiet Kayaking in NYS

Golden Beach

Invasive Species Distribution and Management Overview:

Bush honeysuckle is found sporadically throughout the campground, but was not managed due to time constraints, its widespread distribution, and the size of the plants.

Garlic mustard was mapped and removed from sites 18, between 20 & 22, 35, 37, 39, 41, 43, 47, 61, 64, 65, 67, 80, 82, 87, 89, 102, 104, 108, 109, 111, 117, 124, 130, 132, 170, 177, 179, 184, 206, and 207. In total, 406 garlic mustard plants were removed from 31 locations within the campground. This marks a decrease from peak invasion levels observed in 2012, when 9,000 plants were removed from 85 locations (Figure 4).



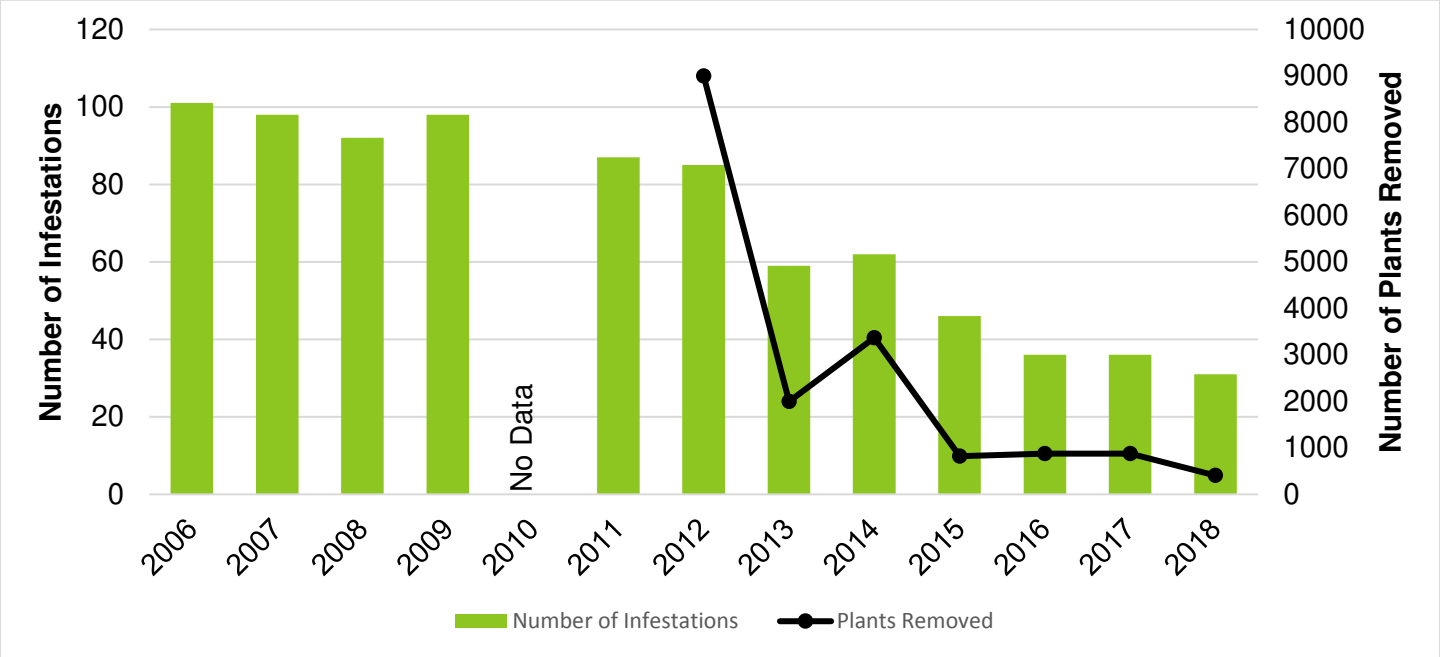


Figure 4. Garlic mustard distribution and management progress at Lake Durant Campground.

Recommendations:

The distribution and abundance of garlic mustard has decreased by 95% since intensive control efforts began in 2012. Continued annual management will be necessary to maintain suppression of garlic mustard at this location. Bush honeysuckle is widespread throughout the campground and should be addressed only after management of higher priority species is complete. However, since this species can be spread long distances via bird dispersed seed, reintroduction is likely. Offering an invasive species identification and management seminar for the campground staff would be useful, if time and resources are available.

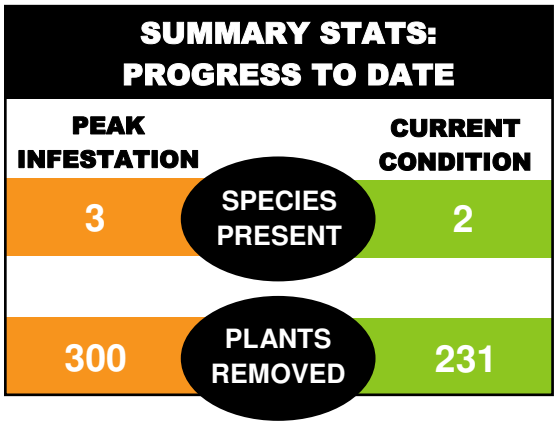
Lake Durant

Invasive Species Distribution and Management Overview:

Bush honeysuckle is found sporadically throughout the campground, but was not managed due to time constraints, its widespread distribution, and the size of plants.

Garlic mustard was not detected at the campground for the first time in 2018. This follows management efforts from 2012-2017. At peak infestation levels documented in 2012, 300 plants were removed from nine locations within the campground (Figure 5).

Wild parsnip was found on both sides of the road leading to the campground boat launch. Most plants were located on the east side of the road, near the water spigot. In total, 231 wild parsnip plants were removed from the roadway. The total number of plants removed increased by nearly 80% from 2017 to 2018 (Figure 6). It's unclear if this increase is the result of infestation expansion, seed bank disturbance, or increased survey and management effort.



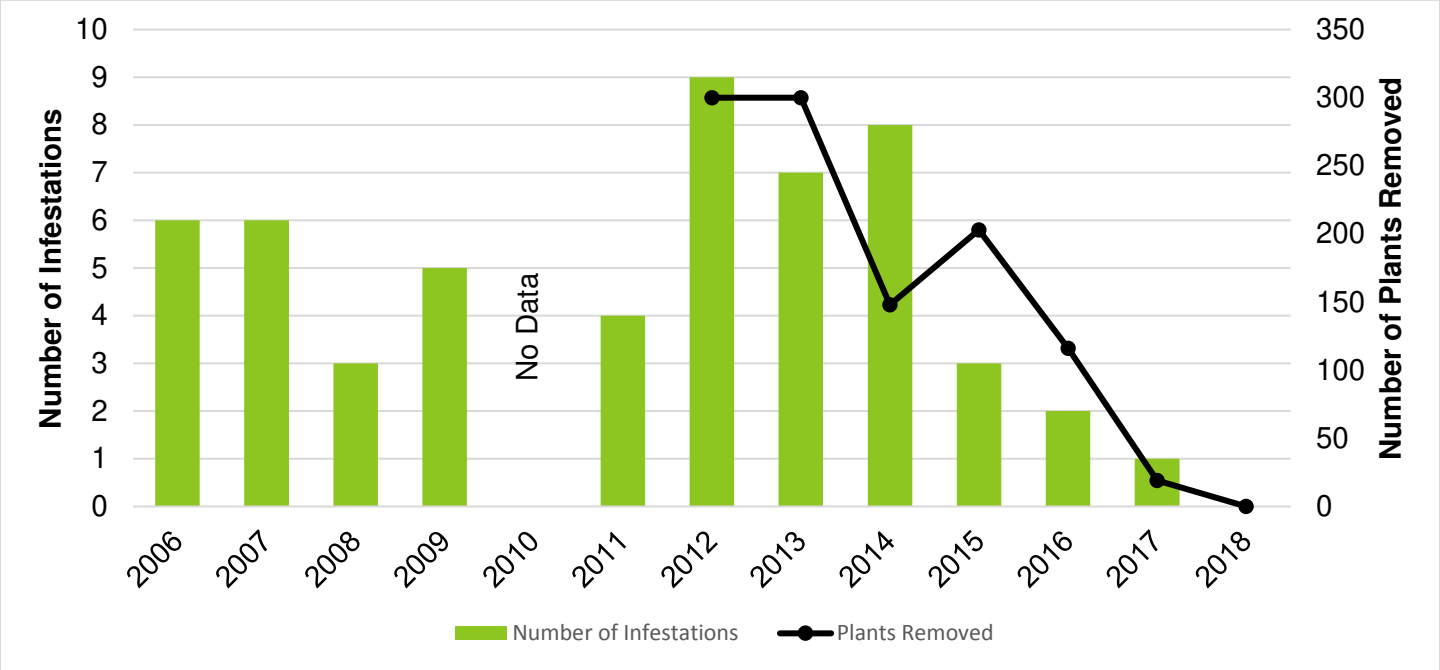


Figure 5. Garlic mustard distribution and management progress at Lake Durant Campground.

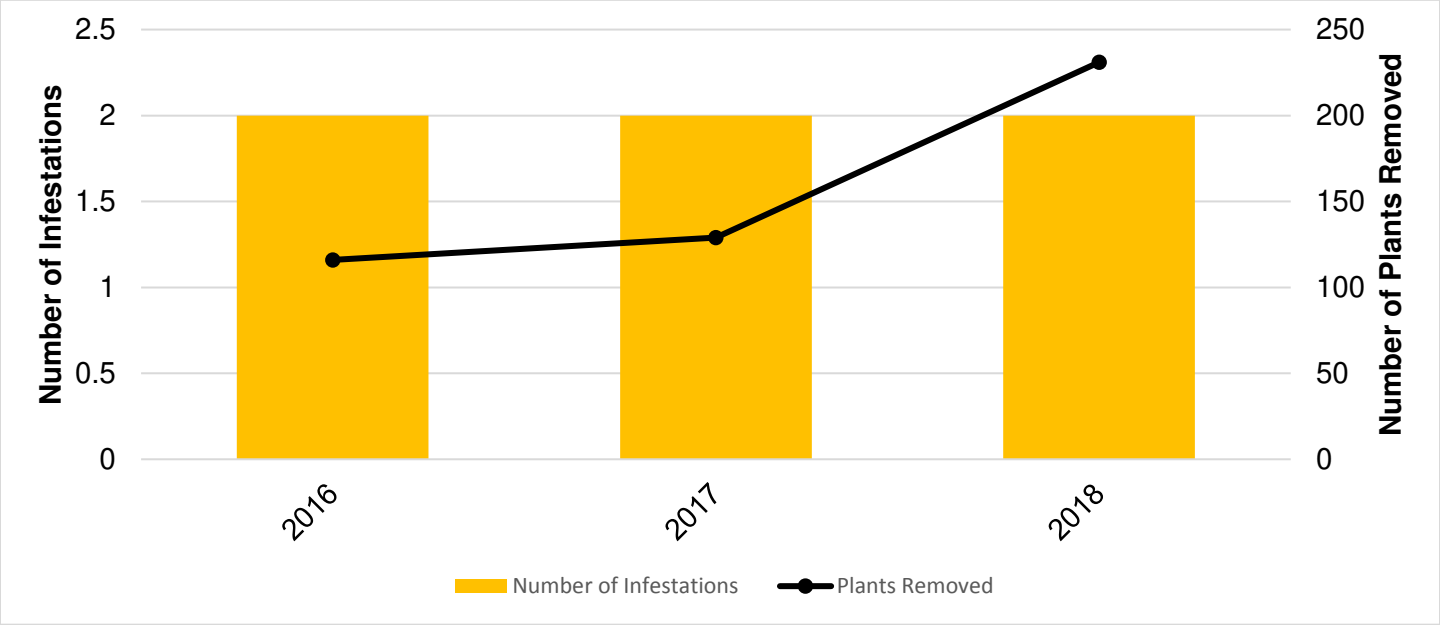


Figure 6. Wild parsnip distribution and management progress at Lake Durant Campground.

Recommendations:

Bush honeysuckle is widespread throughout the campground and should be addressed only after management of higher priority species is complete. However, since this species can be spread long distances via bird dispersed seed, reintroduction is likely. Garlic mustard was not detected at the campground in 2018. Close follow-up monitoring should be conducted annually to confirm local eradication and quickly identify and address potential reemergence. In addition, garlic mustard survey efforts should be expanded to include undeveloped portions of the campground to ensure there are not undetected infestations. Wild parsnip has been managed annually at the campground since 2016. The quantity of plants removed has increased since control efforts were initiated; however, it's unclear from data whether this increase reflects infestation expansion as a result of soil and seed bank disturbance or increased survey and management effort. This should be evaluated in 2019 to determine if continued management efforts are warranted.

Lake Durant
Photo Credit: Margaret M., HipCamp

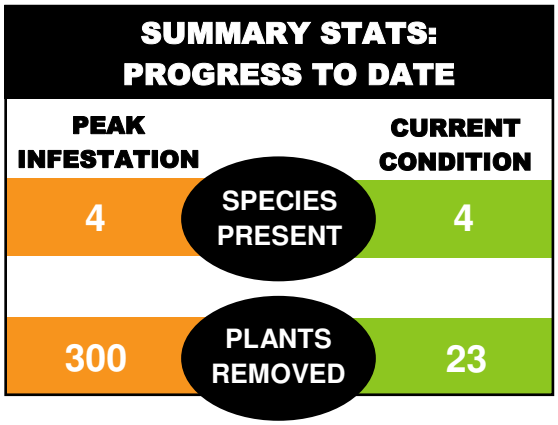
Lewey Lake

Invasive Species Distribution and Management Overview:

Autumn olive was found for the first time at this campground in 2018. A single plant was mapped and removed along the right side of the assistant caretaker cabin.

Bush honeysuckle was mapped and removed from an area adjacent to the assistant caretaker cabin.

Garlic mustard was mapped and removed from sites 36, 59, and 187. In total, 13 garlic mustard plants were removed from three locations in the campground. This marks a significant decrease from peak infestation levels observed in 2013, when 304 plants were removed from ten locations (Figure 7).



Purple loosestrife was mapped and removed from the wetland area behind sites 18-24. In total, only eight plants were removed – a significant decrease from the previous season during which nearly 400 plants were removed (Figure 8). The levels of purple loosstrife observed and removed by the Steward each year have fluctuated historically. This could be attibuted to ongoing management efforts by campground staff, resulting in fewer plants documented by the Steward.

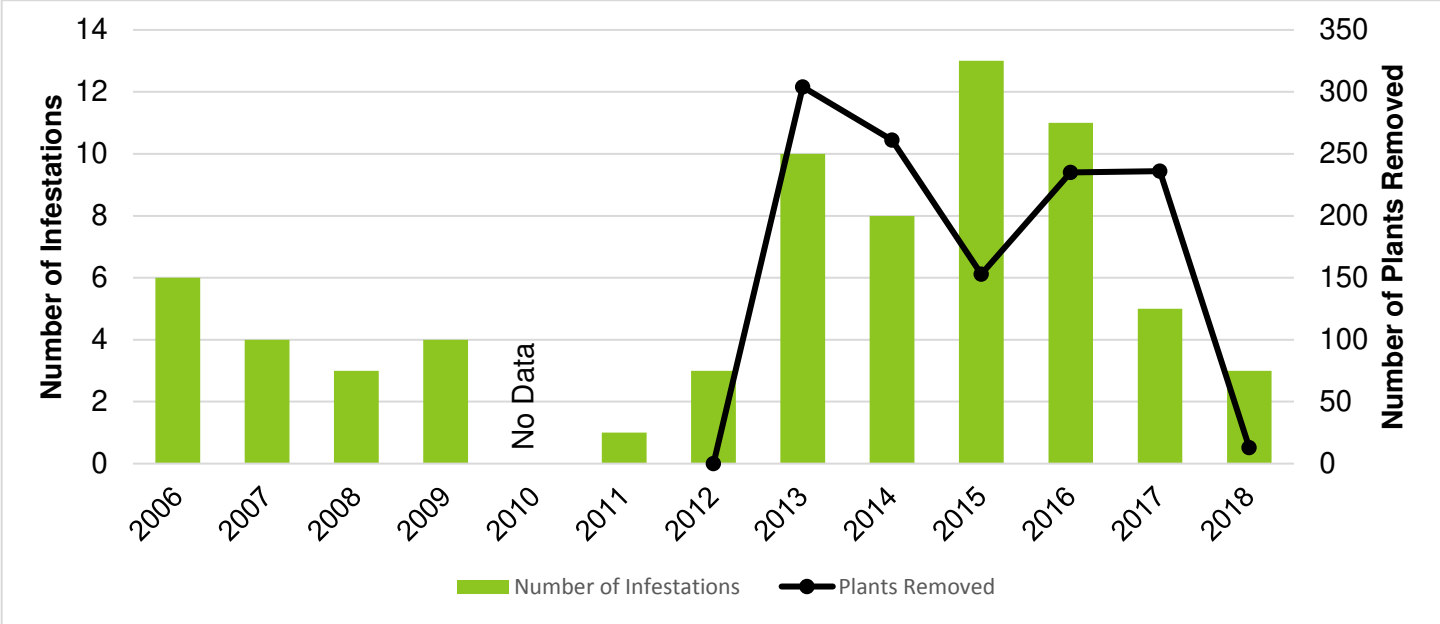


Figure 7. Garlic mustard distribution and management progress at Lewey Lake Campground.

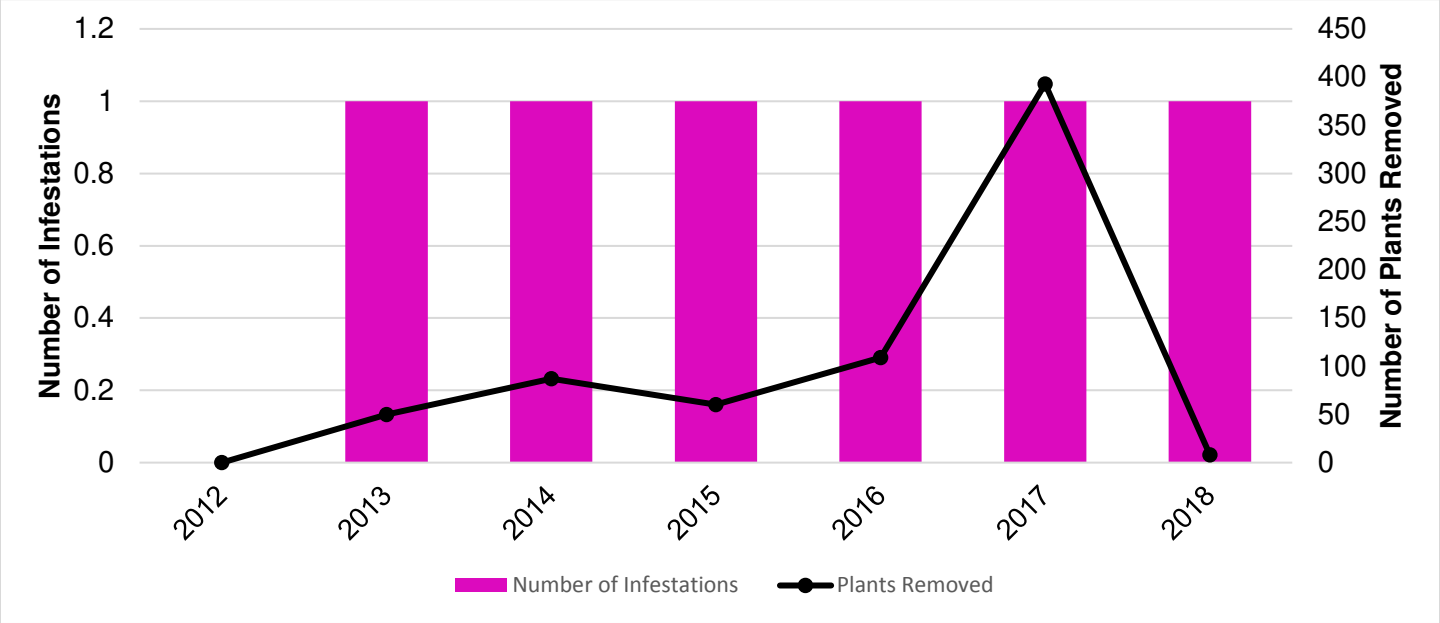


Figure 8. Purple loosestrife distribution and management progress at Lewey Lake Campground.

Recommendations:

The distribution and abundance of both garlic mustard and purple loosestrife have decreased by 96% and 98% from peak levels observed in 2013 and 2017, respectively. With sustained survey and management efforts both species can likely be locally eradicated.

Bush honeysuckle and autumn olive were found at the campground for the first time in 2017 and 2018, respectively. Both species were found in low abundance in 2018 and removed mechanically. Given the low abundance of these species, its recommended that survey and management efforts continue. Wish sustained effort, both species can likely be locally eradiated. However, since both species can be spread long distances via bird dispersed seed, reintroduction is possible.

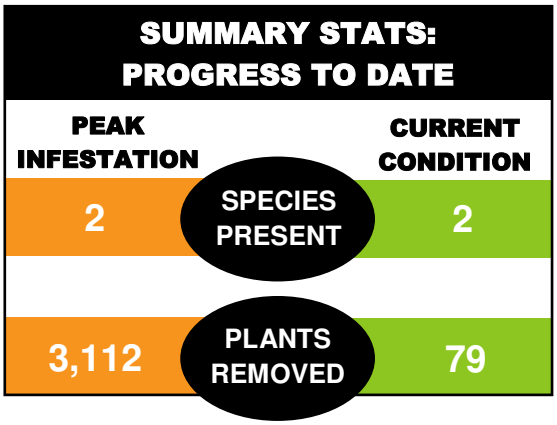
Lewey Lake Campground
Photo Credit: Tim's Camping Review

Limekiln Lake

Invasive Species Distribution and Management Overview:

Bush honeysuckle was mapped at sites 3 and 86 but can be found sporadically throughout the campground. It was not managed due to time constraints, its widespread distribution, and the size of plants.

Garlic mustard was mapped and removed from sites 11, 36, and 115. In total, 79 plants were removed from three locations in the campground. Garlic mustard distribution and abundance has decreased significantly from peak invasion levels observed in 2012 when 3,141 plants were removed from 47 locations (Figure 9).



Recommendations:

Garlic mustard infestations have decreased by 97% from peak infestation levels documented in 2012. With continued control effort, garlic mustard can likely be locally eradicated. Bush honeysuckle is scattered throughout the campground and should be addressed only after management of higher priority species is complete. However, since this species can be spread long distances via bird dispersed seed, reintroduction is likely.

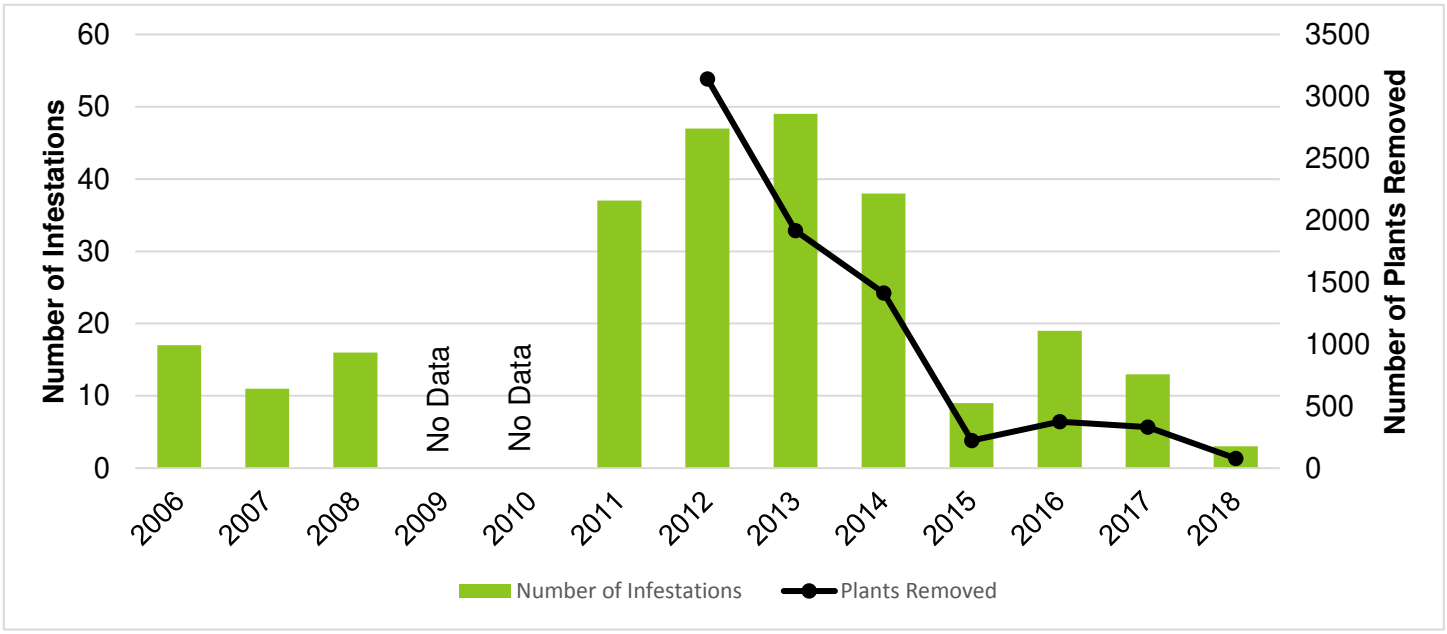


Figure 9. Garlic mustard distribution and management progress at Limeklin Lake Campground.

Indian Lake Islands

Invasive Species Distribution and Management Overview:

This facility was not visited in 2018. The first inventory of this campground was completed with assistance from an SCADEC
crew during the 2015 field season. Purple loosestrife was found in a small bay to the north of site 29 and in small patches along the shoreline adjacent to campsites associated with Lewey Lake Campground. In 2016, a single large patch of purple loosestrife was found on the shoreline of Indian Lake near Lewey Lake Campground sites 18 and 19. If resources are available, this campground should be re-surveyed and managed, if necessary, in 2019.

Tioga Point

Invasive Species Distribution and Management Overview:

This facility was not visited in 2018. An initial inventory was performed in 2015 and no target invasive species were detected. Invasion risk/vulnerability is presumed low at this location due to its isolated location and comparatively low levels of use. If time and access to a boat are available, this campground should be re-surveyed in 2019.

Tioga Point Campground
Photo Credit: I Love NY

Northville Working Circle

The Northville working circle contains seven campgrounds: Caroga Lake, Little Sand Point, Moffitt Beach. Northampton Beach, Point Comfort, Poplar Point, and Sacandaga. Invasive species were detected at all campgrounds in this working circle in 2018. The following section provides an overview of survey and management activities for these locations.

NORTHVILLE WORKING CIRCLE MANAGEMENT SUMMARY			
Campground	**Invasive Plants Present**	**Total Plants Removed**	**Density of Infestations**
Caroga Lake	Autumn Olive	2	Sparse
	Garlic Mustard	1	Sparse
	Purple Loosestrife	1	Sparse
	Bush Honeysuckle	0	Sparse
	Phragmites	0	Moderate
	Knotweed spp.	0	Low
	Yellow Iris	22	Sparse
Little Sand Point	Garlic Mustard	4	Sparse
	Knotweed spp.	0	High
	Bush Honeysuckle	2	Moderate
Moffitt Beach	Garlic Mustard	113	Low
	Purple Loosestrife	151	Moderate
	Phragmites	0	Low
	Wild Parsnip	24	Sparse
	Autumn Olive	0	Sparse
Northampton Beach	Autumn Olive	0	Low
	Bush Honeysuckle	0	High
	Common Buckthorn	0	Low
Point Comfort	Garlic Mustard	16	Sparse
Poplar Point	Japanese Barberry	2	Sparse
Sacandaga	Knotweed spp.	0	Low

* = Plant was dead/dormant and it was too late in season for effective management.

Density of Infestations:
Sparse – less than 25 plants observed across the campground
Low – 25 – 149 plants observed across the campground
Moderate – 150-500 plants observed across the campground
High – Greater than 500 plants observed across the campground
Extreme – Greater than 500 plants observed across the campground and management of the campground could not be achieved by a five-person crew in one day, or biological control measures are recommended.

Caroga Lake

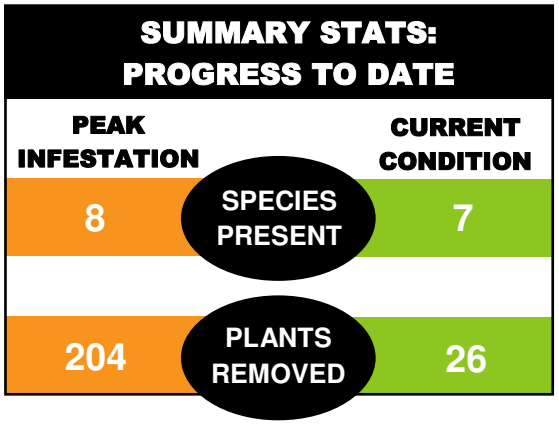
Invasive Species Distribution and Management Overview:

Autumn olive was mapped and removed adjacent to bathroom building 15 and near a hemlock tree within the picnic area. An additional infestation was located near building seven, but the plants were too large to remove using mechanical techniques.

Bush honeysuckle was found sporadically throughout the campground, but plants were too large to manage mechanically.

Garlic mustard was mapped and removed from site 42. Only one plant was removed; however, this still represents an increase in abundance from 2017 when no garlic mustard was observed (Figure 10).

Japanese barberry has been reported in the campground in previous seasons, but no plants were detected in 2018.



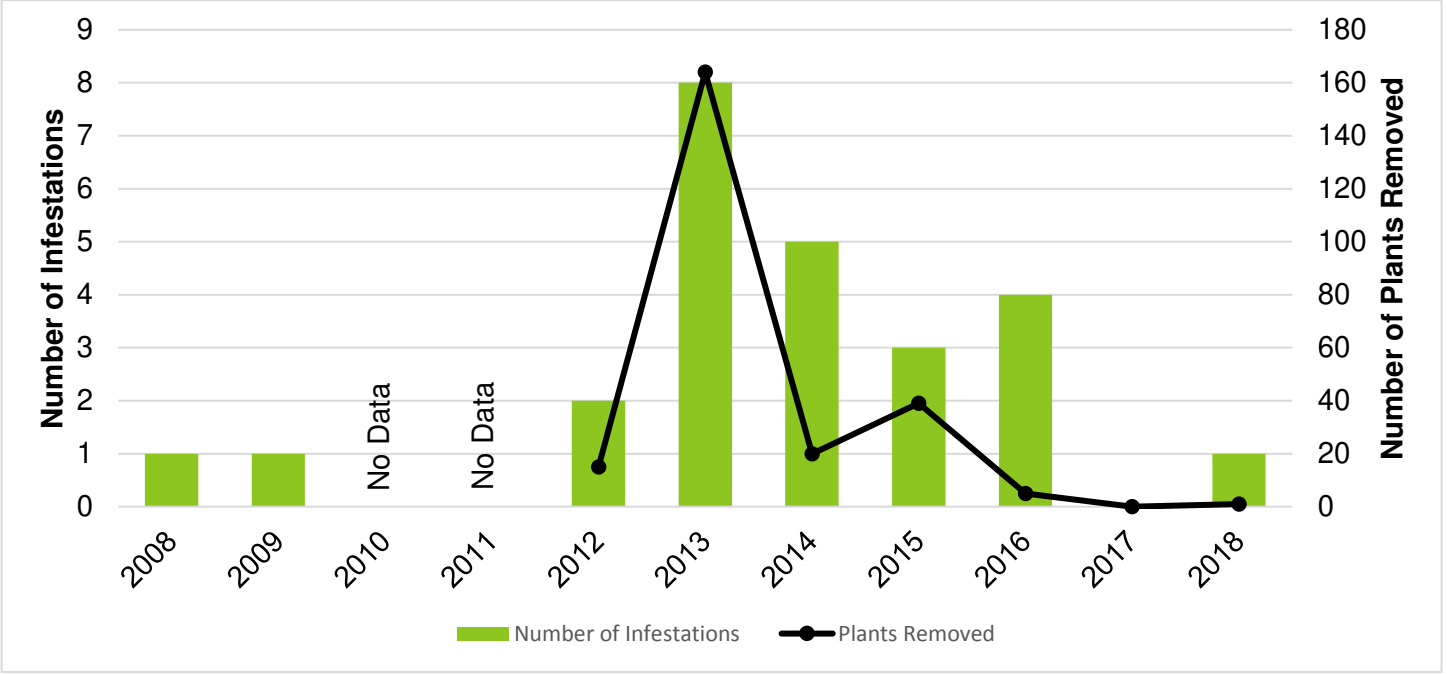


Figure 10. Garlic mustard distribution and management progress at Caroga Lake Campground.

Knotweed spp. were mapped along the fence across from site 146 and behind sites 155 & 156. Mechanical control of knotweed is generally not effective, so no management was performed. This infestaiton will be prioritzed for chemcial control by APIPP's response team in 2019.

Phragmites was mapped at a culvert near site 91 and at the end of the break adjacent to the beach. Mechanical control of *Phragmites* is generally not effective, so no management was performed. This infestaiton will be prioritzed for chemical control by APIPP's response team in 2019.

Purple loosestrife was mapped and removed along the mouth of the inlet stream, near site 91. A single plant was removed from the streamside, a decrease from two plants removed in 2017 (Figure 11).

Yellow iris was mapped and removed near the campground boat launch and along the shoreline extending from the boat launch. In total, 22 plants were removed, representing a 90% decrease from 2017 infestation levels (Figure 12).

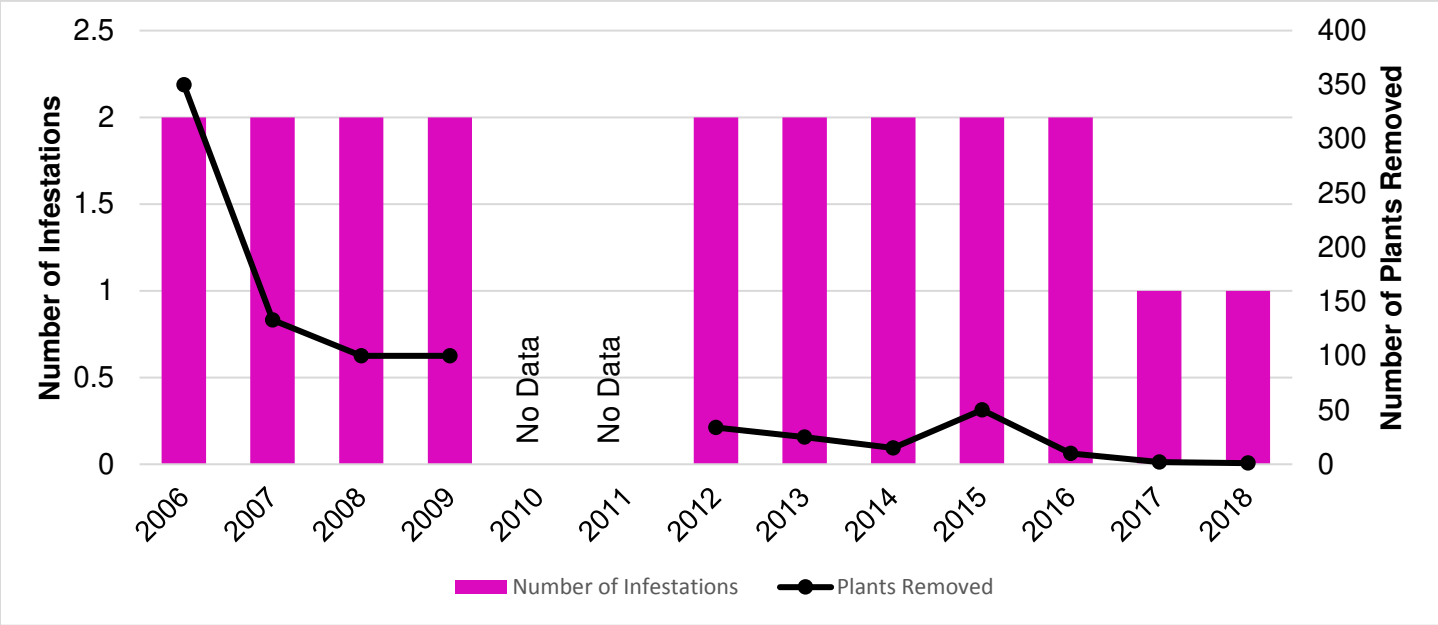


Figure 11. Purple loosestrife distribution and management progress at Caroga Lake Campground.

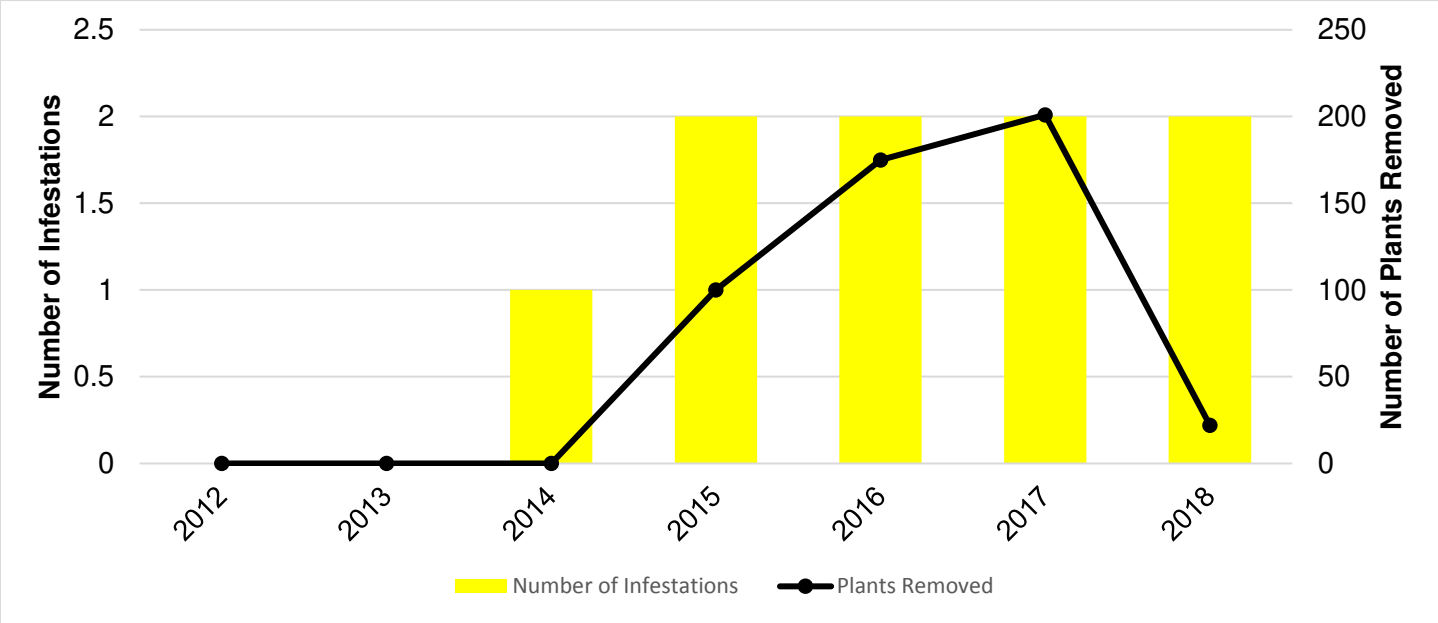


Figure 12. Yellow iris distribution and management progress at Caroga Lake Campground.

Recommendations:

Garlic mustard and purple loosestrife should remain top survey and management priorities for this campground. Both species have declined by 99% from historic peak infestation levels. With sustained management effort, garlic mustard and purple loosestrife can likely be locally eradicated. However, it should be noted that purple loosestrife is present along the shoreline outside the campground facility, so continued monitoring and management will be required. Yellow iris abundance has declined by 89% from peak infestation levels documented in 2017 and should remain a priority for monitoring and management. The abundance of plants present at the campground has precluded complete control of infestations in previous years, but all infestations were removed in 2018. Autumn olive is not widely distributed and can likely be locally eradicated from the campground with continued management. Bush honeysuckle occurs sporadically throughout the campground but is widespread in the surrounding landscape. Plants can be managed when time and resources allow, but only after management of higher priority species has been completed. Since these woody species can be spread long distances via bird dispersed seed, reintroduction is likely. All *Phragmites* and knotweed infestations should be treated with herbicide by APIPP's terrestrial response team in 2019, if possible, to minimize their continued growth and spread throughout the campground and surrounding areas. Given their small extent, they can likely be eradicated through sustained, annual management.

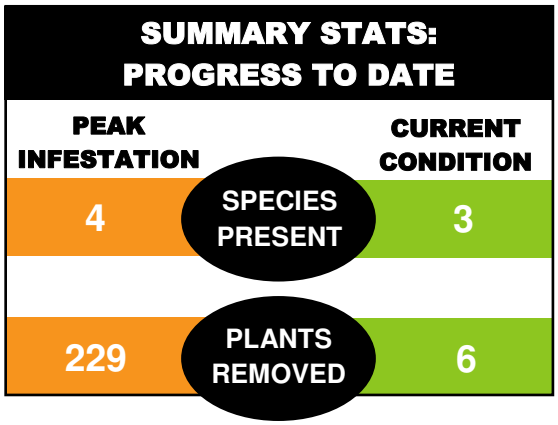
Caroga Lake Campground
Photo Credit: Fishing With Floyd

Little Sand Point

Invasive Species Distribution and Management Overview:

Bush honeysuckle was mapped at sites 4, 5, 13, 17, 19, and 21. Two plants were removed from an isolated infestation; however, most plants were not managed due to widespread species distribution.

Garlic mustard was mapped and removed from sites 23 and 24. In total, four plants were removed from two locations within the campground (Figure 13). This represents a significant decrease from peak infestation levels observed in 2013 when 229 plants were removed from three locations.



Japanese barberry was mapped and managed in 2015 but has not been observed since.

Knotweed spp. were mapped at two locations just behind the registration booth near the campground entrance. The first infestation borders site 4 and the second borders sites 5 and 6, extending down a stream towards the lake. No management was performed by the Steward, but all infestations were treated with herbicide by APIPP's terrestrial response team in September.

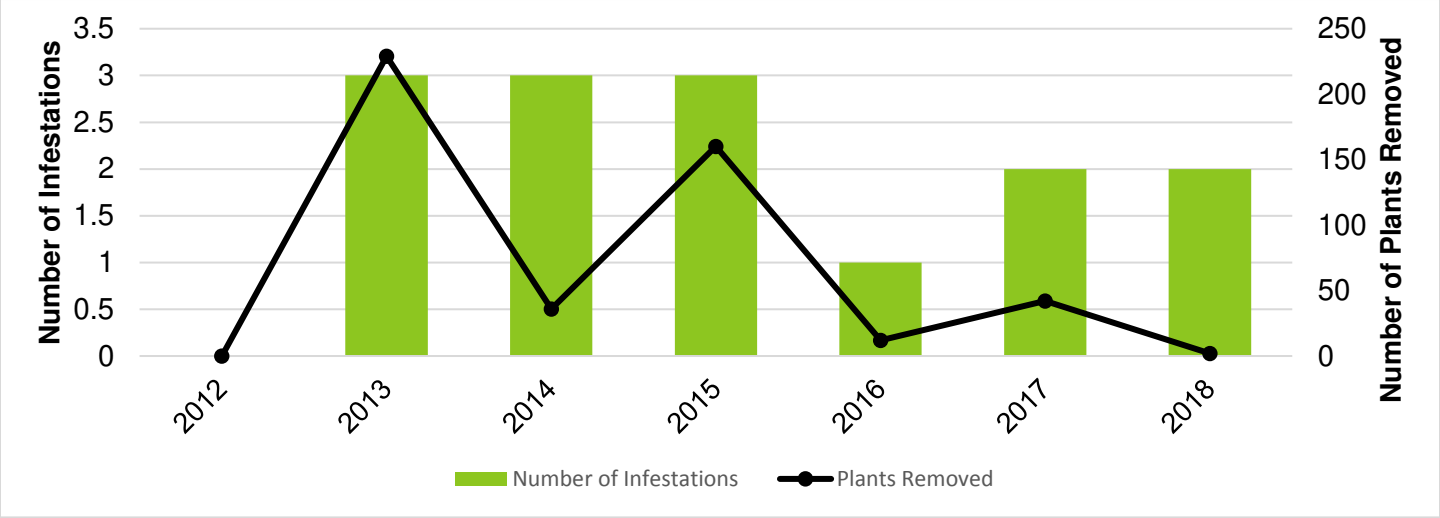


Figure 13. Garlic mustard distribution and management progress at Little Sand Point Campground.

Recommendations:

Garlic mustard should remain a top survey and management priority for this campground. Total abundance has declined by 97% from peak observation levels observed in 2013. With continued control effort, garlic mustard can likely be locally eradicated. Additional effort should be dedicated to surveying undeveloped portions of the campground to ensure there are not undetected source infestations. All knotweed spp. infestations should be surveyed and treated with herbicide by APIPP's response team. Given the small extent of the infestations, local eradication is likely. Future stewards should remain vigilant for purple loosestrife and Japanese barberry, which have been present at the facility in previous seasons or are located nearby.

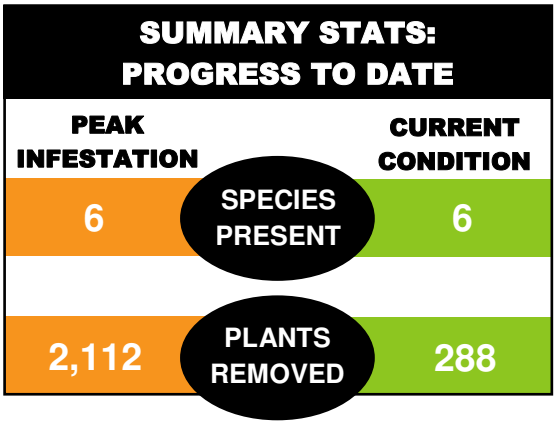
Moffitt Beach

Invasive Species Distribution and Management Overview:

Autumn olive was mapped at site 101 but was not removed due to the size of the plant.

Balsam woolly adelgid was documented for the first time at this facility in 2016. The infestation should be monitored annually to document spread.

Garlic mustard was mapped and removed from sites 178, 180, 182, 208, 224, 252A, and 258. In total, 113 plants were removed from seven locations in the campground. This marks a decrease from peak invasion levels observed in 2014, when 1,100 plants were removed from 13 locations (Figure 14).



Phragmites was mapped adjacent to the beach, near the parking lot and at site 106. Mechanical control of *Phragmites* is generally not effective, so no management was performed. This infestaiton will be prioritzed for chemical control by APIPP's response team in 2019.

Purple loosestrife is abundant and dense near the campground waste area. Most plants at this location were not removed. Smaller, isolated infestations were mapped and removed near the boat launch parking lot, the swampy area in front of sites 102-105, and across from the waste area. In total, 151 plants were removed from four locations (Figure 15).

Wild parsnip was mapped and removed from site 103. In total, 24 plants were removed, a significant decrease from peak infestation levels observed in 2012, when 451 plants were removed from three locations (Figure 16).

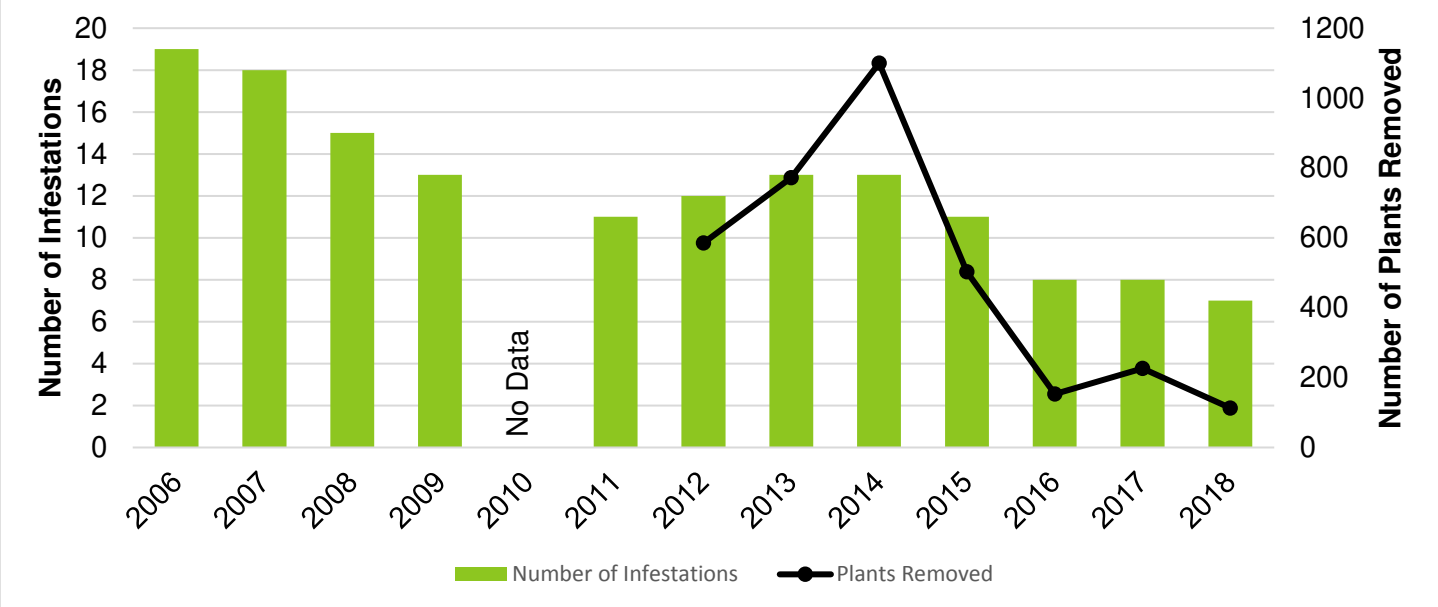


Figure 14. Garlic mustard distribution and management progress at Moffitt Beach Campground.

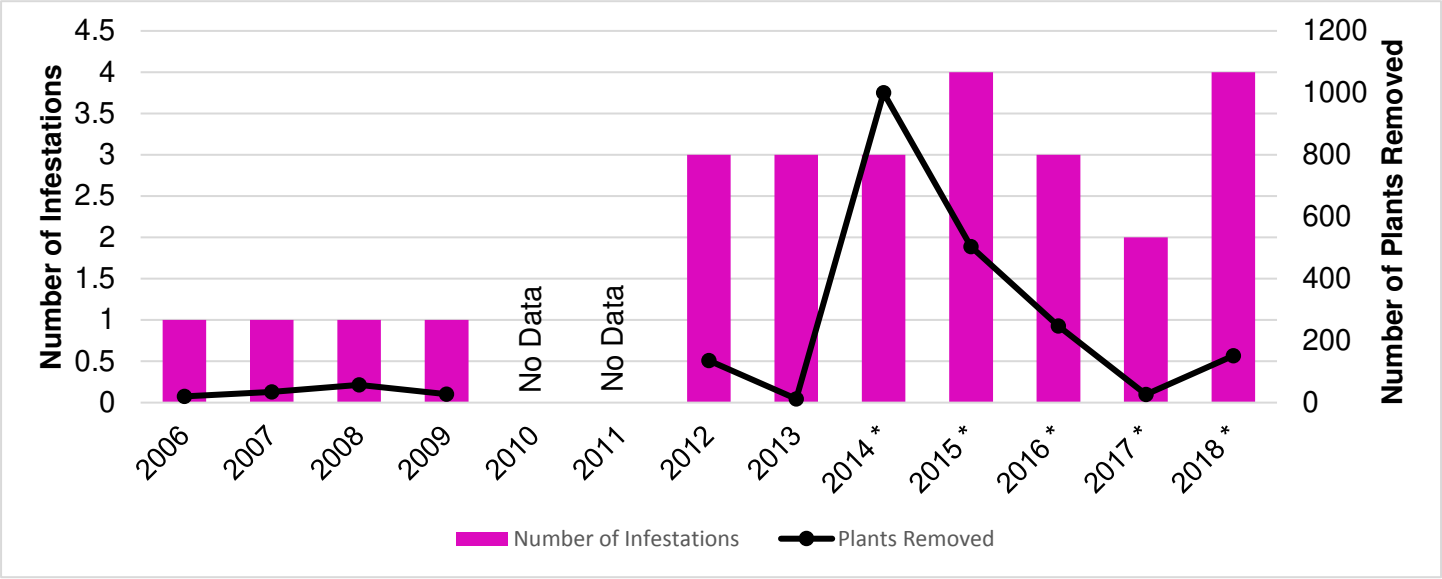


*Figure 15. Purple loosestrife distribution and management progress at Moffitt Beach Campground. * indicates years in which control of all known infestations was not completed.*

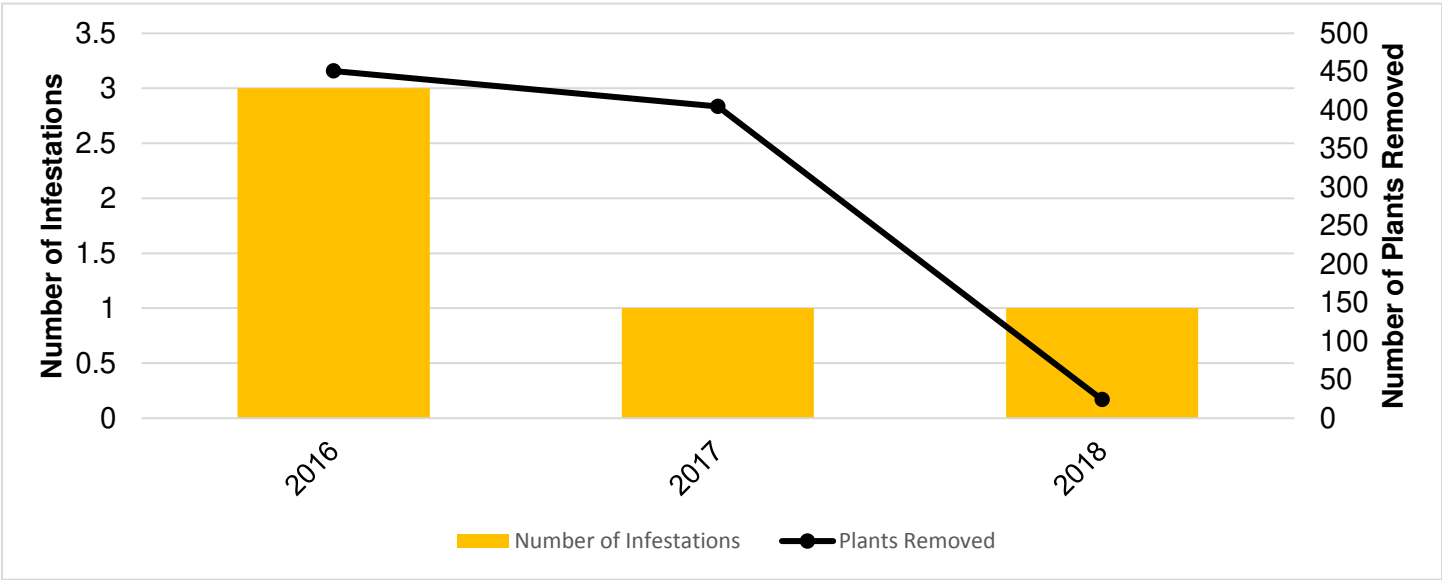


Figure 16. Wild parsnip distribution and management progress at Moffitt Beach Campground.

Recommendations:

Autumn olive was found at only one location at the campground in 2018 but could not be managed due to plant size. Heavier equipment should be utilized to remove this infestation in 2019 before it has a chance to spread. Garlic mustard should remain a top survey and management priority for this facility. Abundance has declined by 95% since intensive control efforts began in 2012. With continued effort garlic mustard can likely be locally eradicated. An isolated infestation of *Phragmites* present near the beach should be prioritzed for chemical control by APIPP's response team in 2019. A combination of mechanical and biological control techniques should be deployed in 2019 to address purple loosestrife at this facilty. Isolated infestaions should continue to be managed mechanically; however, the use of biocontrol agents is strongly advised for the large infesation located near the waste area. Wild parsnip has been managed annually at this campground since 2016. Plant abundance has decreased by 95% and with continued control, this species can likely be locally eradiated.

Northampton Beach

Invasive Species Distribution and Management Overview:

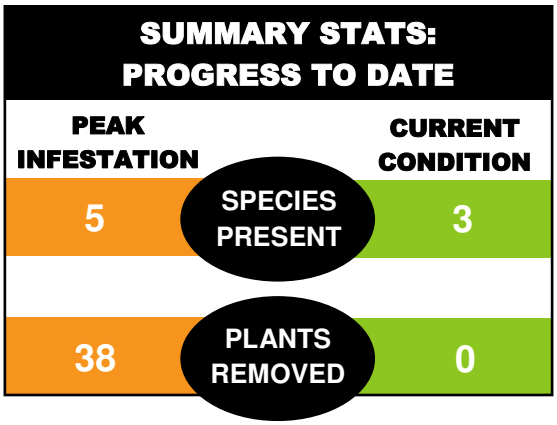
Autumn olive was observed at site 212 but was not removed due to the size of plants.

Bush honeysuckle is found throughout the campground. It was not managed due to time constraints, its widespread distribution, and the size of plants.

Common buckthorn was observed at site 218 and adjacent to the roadside near the west end of the campground but was not managed due to the size of plants.

Garlic mustard was not observed in 2018. This follows active management in 2017 when 16 plants were removed from three locations (Figure 17).

Japanese barberry was documented and managed at the campground in 2015 but has not been observed since.



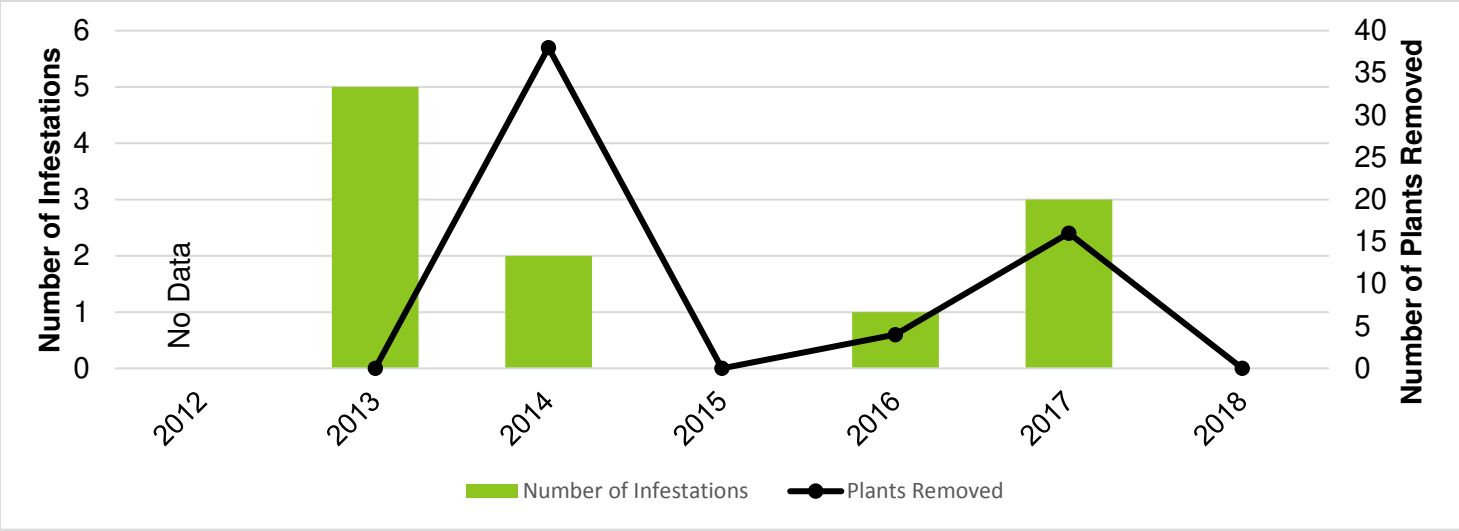


Figure 17. Garlic mustard distribution and management progress at Northampton Beach Campground.

Recommendations:

Garlic mustard was not observed at the campground in 2018, following an increase in infestation levels from 2016 to 2017. Early detection surveys for this species should remain a top priority to fully document local eradication and quickly address potential reemergence. With continued effort, garlic mustard can likely be locally eradicated. Additional effort should be dedicated to surveying undeveloped portions of the campground to ensure there are not undetected source infestations. With few herbaceous species present at this facility, management efforts can shift to focus on a suite of woody species. Initial control efforts should focus on species of lower abundance, such as autumn olive and common buckthorn, before addressing more widespread species like bush honeysuckle. Future stewards should remain vigilant for the reemergence of Japanese barberry, particularly around site 124.

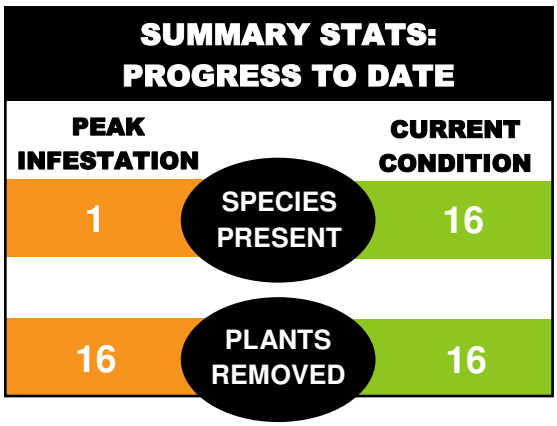
Point Comfort

Invasive Species Distribution and Management Overview:

Garlic mustard was mapped and removed from an isolated area between sites 48 & 49. In total, 16 plants were removed. This represents an increase in garlic mustard abundance from 2017 when no invasive plants were observed (Figure 18). This is also the greatest number of plants removed from the campground in a single season, followed by 2014 when eight plants were removed. However, the total number of infestations has decreased from the historic high observed in 2012.

Recommendations:

Garlic mustard is the only target species present at this campground and should remain the top survey and management priority. Plant abundance increased in 2018 to an all-time high. Additional time should be allocated to survey undeveloped portions of the campground to search for potentially undetected source infestations. Even with this recent increase, overall abundance remains low and with continued control effort, garlic mustard can likely be locally eradicated.



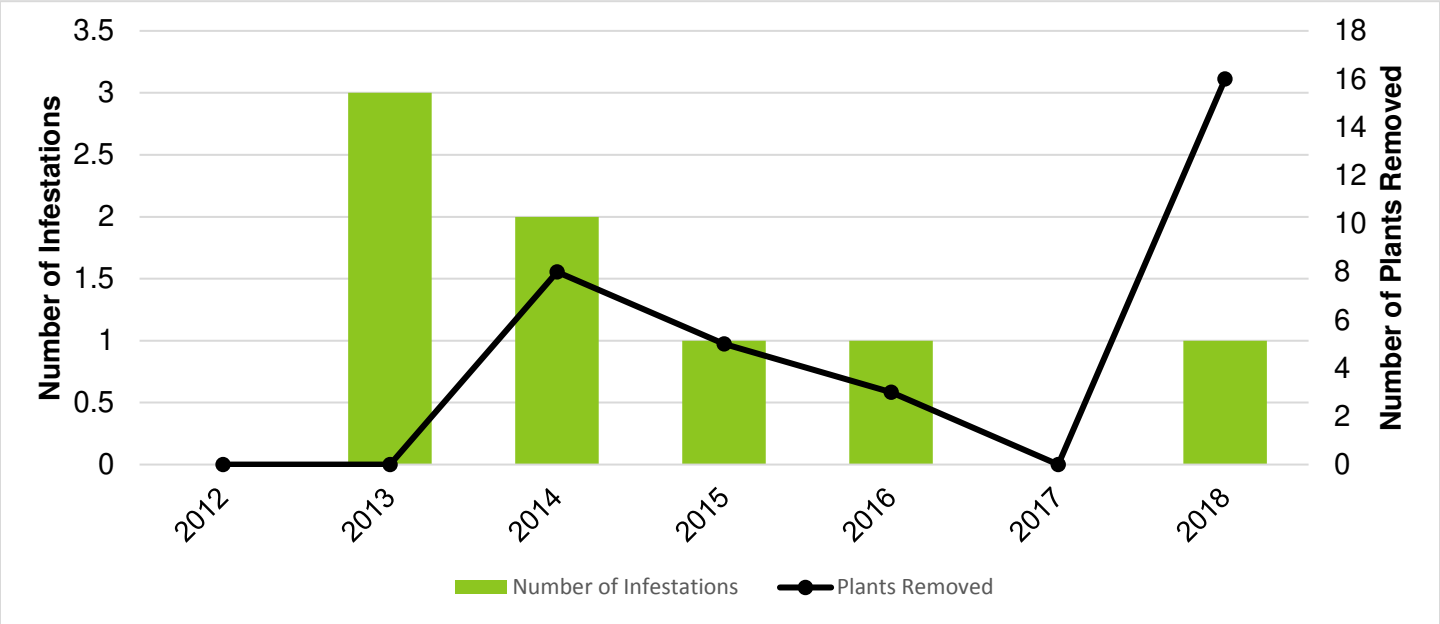


Figure 18. Garlic mustard distribution and management progress at Point Comfort Campground.

Poplar Point

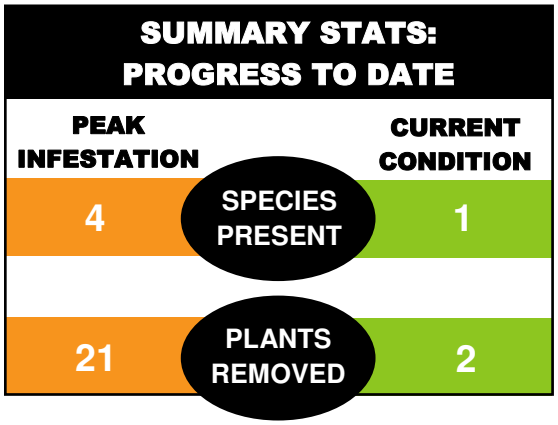
Invasive Species Distribution and Management Overview:

Garlic mustard was not observed in 2018. This marks two consecutive years that this species has been absent from the campground (Figure 19).

Japanese barberry was mapped and removed from site 21. Only two plants were detected and managed mechanically.

Knotweed spp. were documented in 2016 but have not been observed since. It's presumed that campground staff are managing the infestation.

Purple loosestrife was not observed in 2018, following active management in 2017 when four plants were removed from four locations (Figure 20).



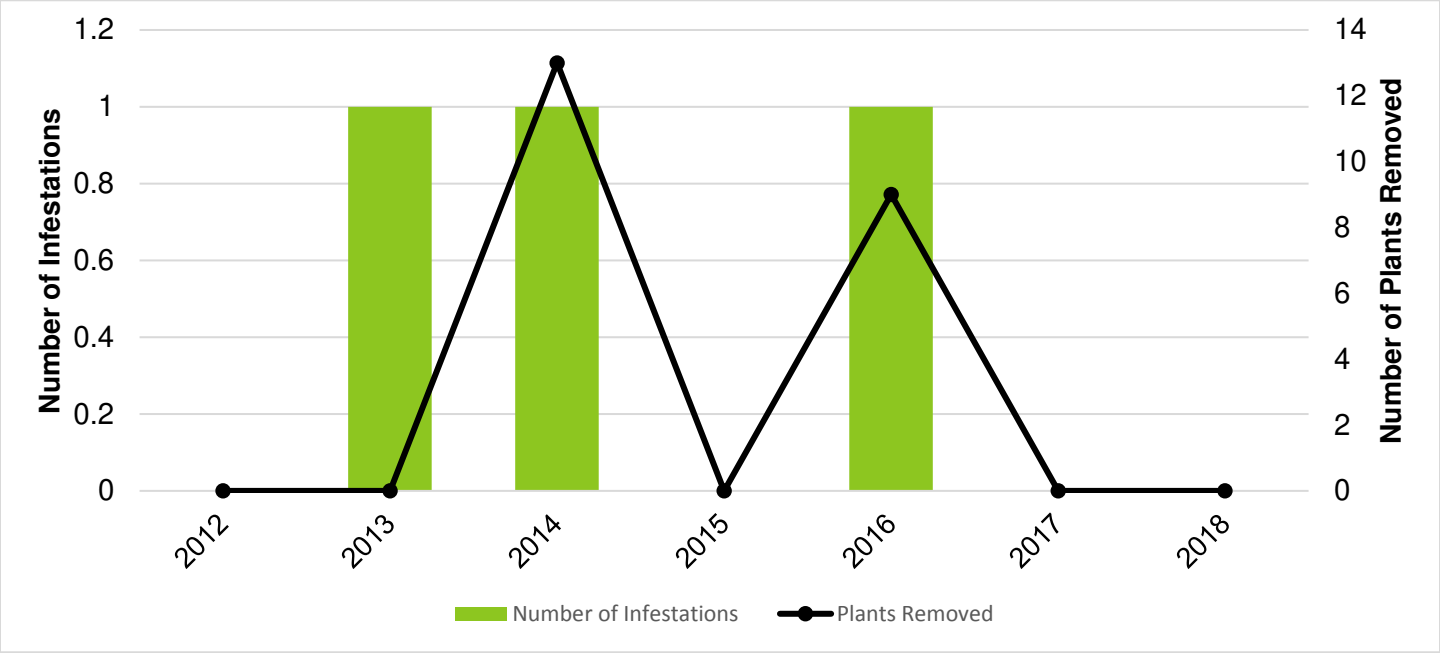


Figure 19. Garlic mustard distribution and management progress at Poplar Point Campground.

Recommendations:

Significant progress has been achieved managing herbaceous species at this campground. Garlic mustard, knotweed spp., and purple loosestrife were not observed in 2018. This marks two, two, and one years of consecutive absence, respectively. These species should remain top survey priorities to fully document local eradication and quickly identify and address potential reemergence. Only two barberry plants were removed in 2018. Continued management efforts can likely result in local eradication of all target species from this campground.

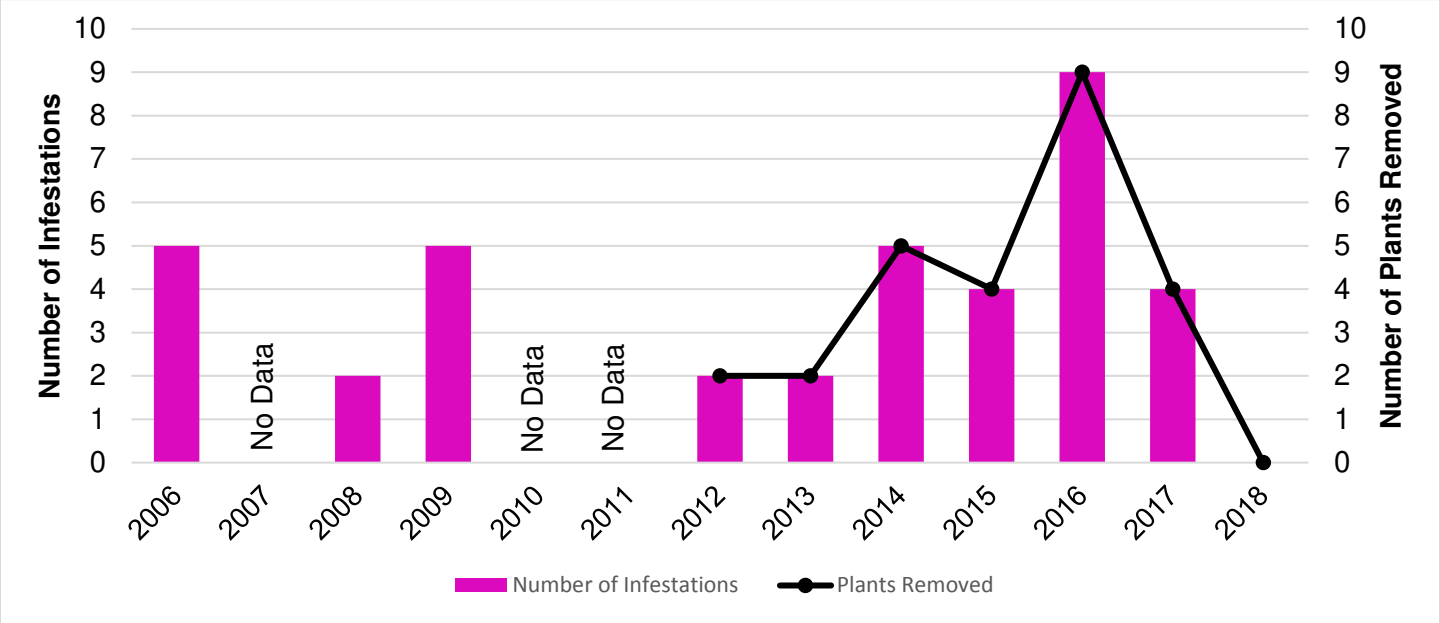


Figure 20. Purple loosestrife distribution and management progress at Poplar Point Campground.

Poplar Point Campground
Photo Credit: SLE / SWIM

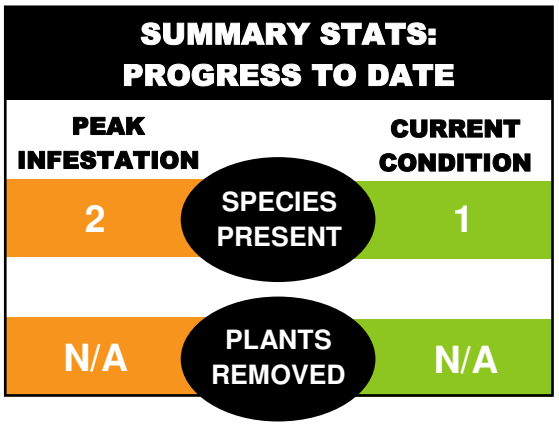
Sacandaga

Invasive Species Distribution and Management Overview:

Garlic mustard was not observed in 2018 and is considered locally eradicated (Figure 21).

Knotweed spp. were mapped behind sites 30, 32 and 34, as well as along State Route 30. No management was performed by the Steward; however, all infestations were treated with herbicide by APIPP's terrestrial response team in September.

Recommendations:



Although garlic mustard has been locally eradicated from this campground, surveys should continue to rapidly identify and address any potential reemergence, especially around site 101. Additional effort should be dedicated to surveying undeveloped portions of the campground to ensure there are not undetected infestations.

All knotweed infestations should continue to be managed with herbicide by APIPP's terrestrial response team. Given their limited extent, these infestations can likely be locally eradicated though sustained management.

A single purple loosestrife plant was removed approximately one-half mile upstream of the campground in 2016. Future surveys should remain vigilant for possible encroachment of this species into the campground.

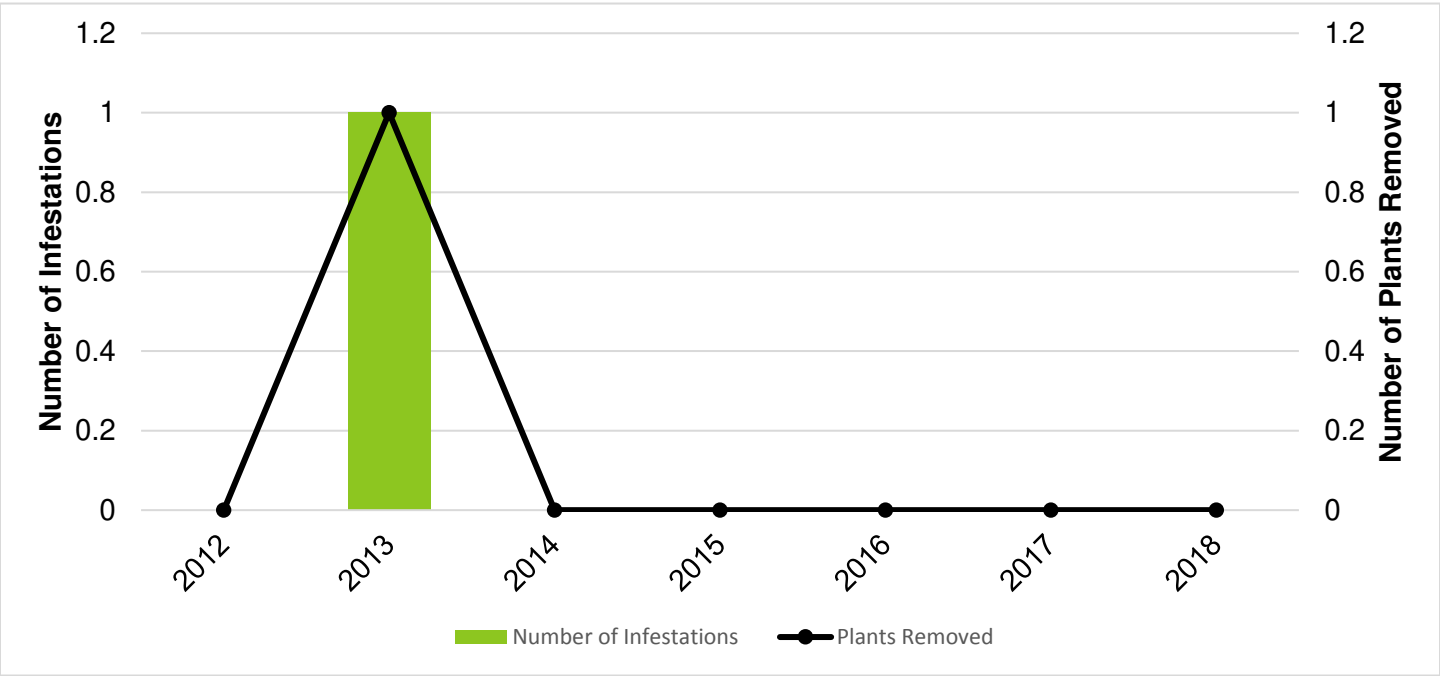


Figure 21. Garlic mustard distribution and management progress at Sacandaga Campground.

Potsdam Working Circle

The Potsdam working circle contains one campground: Cranberry Lake. The following section provides an overview of survey and management activities for this facility.

POTSDAM WORKING CIRCLE MANAGEMENT SUMMARY			
Campground	**Invasive Plants Present**	**Total Plants Removed**	**Density of Infestations**
Cranberry Lake	Bush Honeysuckle Common Buckthorn Garlic Mustard Reed Canary Grass	6 0 1220 0	Sparse Sparse Extreme High

* = Plant was dead/dormant and it was too late in season for effective management.

Density of Infestations:
Sparse – less than 25 plants observed across the campground
Low – 25 – 149 plants observed across the campground
Moderate – 150-500 plants observed across the campground
High – Greater than 500 plants observed across the campground
Extreme – Greater than 500 plants observed across the campground and management of the campground could not be achieved by a five-person crew in one day, or biological control measures are recommended.

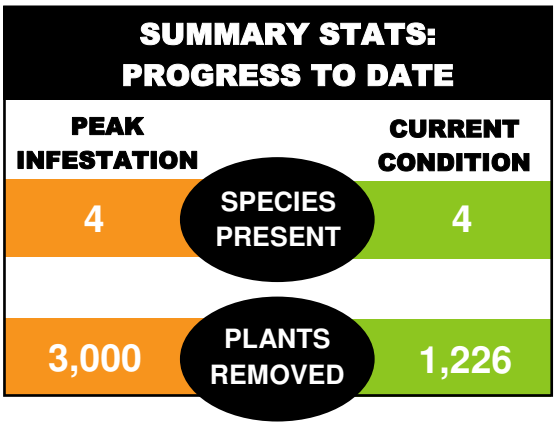
Cranberry Lake
Photo Credit: Tony Biale

Cranberry Lake

Invasive Species Distribution and Management Overview:

Bush honeysuckle was found near the bathrooms on the north end of the campground. It was not managed due the size of plants present.

Common buckthorn was observed at site 55 but was not managed due to the size of plants.



Garlic mustard was mapped and removed from sites 37, 38, 40, 45, 50, 80, 82, 92, 96, 98, 99, near the bathrooms in loop one, along the road between peninsula loop and amphitheater parking, and near site 24. In total, 1,220 plants were removed from 23 locations within the campground. This is an increase in the number of plants removed compared to 2017. This resulted from the detection of a new infestation containing over 600 plants in 2018. However, it should be noted that the total number of invaded sites also increased sharply from 2017 to 2018 (Figure 22). The cause of this sudden increase is unknown.

Reed canary grass was observed at site 55 but was not managed.

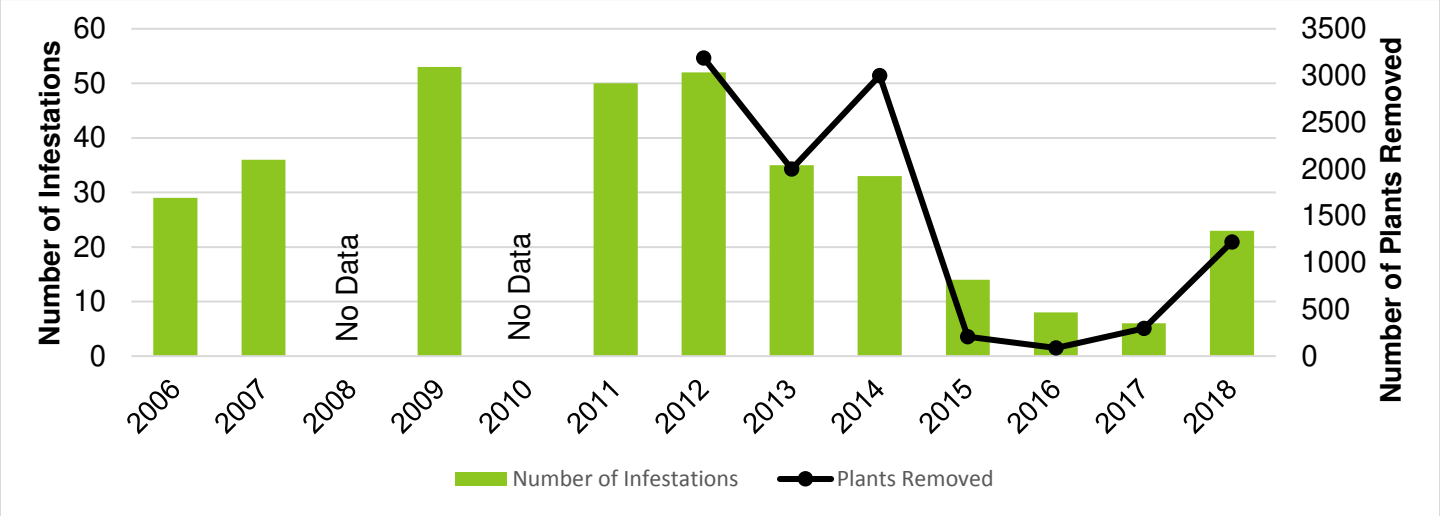


Figure 22. Garlic mustard distribution and management progress at Cranberry Lake Campground.

Recommendations:

Garlic mustard exhibited an increase in distribution and abundance from 2017 to 2018. However, abundance is still 60% lower than the historic high observed in 2012. There should be a concerted effort in 2019 to ensure all propagule sources are removed, including surveys of undeveloped portions of the campground for previously undetected infestations. Common buckthorn remains limited in distribution and should be targeted for management in 2019 using appropriate tools and techniques. Bush honeysuckle is widespread throughout the campground and should be addressed only after management of higher priority species is complete. However, since these woody species can be spread long distances via bird dispersed seed, reintroduction is likely. Reed canary grass should be monitored for spread but is not a management target.

Ray Brook Working Circle

The Ray Brook working circle contains 17 campgrounds: Ausable Point, Buck Pond, Crown Point, Fish Creek Pond, Lake Eaton, Lake Harris, Lincoln Pond, Meacham Lake, Meadowbrook, Paradox Lake, Poke-O-Moonshine, Putnam Pond, Rollins Pond, Saranac Lake Islands, Sharp Bridge, Taylor Pond, and Wilmington Notch. Fifteen locations were surveyed and managed in 2018. Target invasive species were present at eight campgrounds and absent from seven. The following section provides an overview of survey and management activities for these locations.

RAYBROOK WORKING CIRCLE MANAGEMENT SUMMARY			
Campground	**Invasive Plants Present**	**Total Plants Removed**	**Density of Infestations**
Ausable Point	Not inventoried in 2018		
Buck Pond	None Observed	N/A	N/A
Crown Point	Garlic Mustard Purple Loosestrife Wild Parsnip Bush Honeysuckle Autumn Olive Common buckthorn	0* 77 359 0 0 0	Low Low Extreme Sparse Sparse Sparse
Fish Creek Pond	Bush Honeysuckle Purple Loosestrife	1 7	Low Sparse
Lake Eaton	None Observed	N/A	N/A
Lake Harris	Purple Loosestrife	274	Moderate
Lincoln Pond	Purple Loosestrife	2	Sparse
Meacham Lake	None Observed	N/A	N/A
Meadowbrook	Bush Honeysuckle	1	Low
Paradox Lake	Garlic Mustard Purple Loosestrife	7 256	Sparse Moderate
Poke-O-Moonshine	None Observed	N/A	N/A
Putnam Pond	None Observed	N/A	N/A
Rollins Pond	None Observed	N/A	N/A
Saranac Lake Islands	Not Inventoried in 2018		
Sharp Bridge	Purple Loosestrife	37	Low
Taylor Pond	Purple Loosestrife	40	Low
Wilmington Notch	None Observed	N/A	N/A

* = Plant was dead/dormant and it was too late in season for effective management.

Density of Infestations:
Sparse – less than 25 plants observed across the campground
Low – 25 – 149 plants observed across the campground
Moderate – 150-500 plants observed across the campground
High – Greater than 500 plants observed across the campground
Extreme – Greater than 500 plants observed across the campground and management of the campground could not be achieved by a five-person crew in one day, or biological control measures are recommended.

Ausable Point

Invasive Species Distribution and Management Overview:

This facility was not visited in 2018 due to time constraints. The campground should be a high priority for follow up survey and management in 2019 to address known infestations of the following species:

Bush honeysuckle is widespread throughout the campground and beyond the threshold for eradication or containment. Mechanical management can suppress populations, but efforts will need to be advanced in perpetuity and reintroduction is likely.

Oriental bittersweet is widespread throughout the campground and beyond the threshold for eradication or containment. Mechanical management can suppress populations, but efforts will need to be advanced in perpetuity and reintroduction is likely.

Purple loosestrife is well established at this campground and beyond the point of mechanical control. This location should be prioritized for biocontrol release in 2019. Continued mechanical management of isolated infestations will slow the encroachment of purple loosestrife into the interior of the campground.

Buck Pond

Invasive Species Distribution and Management Overview:

No target invasive species were detected at this facility in 2018. This campground should be monitored annually for new infestations of terrestrial invasive species.

Buck Pond Campground
Photo Credit: DEC

Crown Point

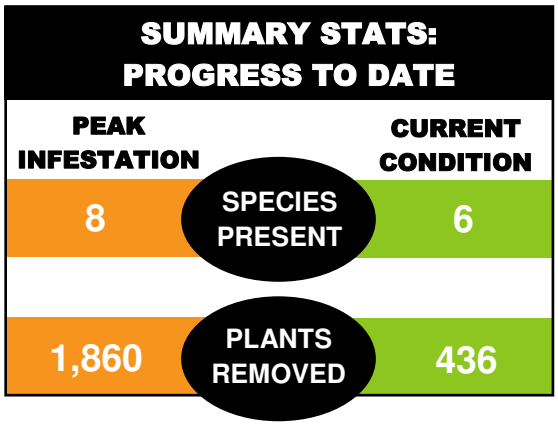
Invasive Species Distribution and Management Overview:

Autumn olive was mapped near the disc golf trail, but plants were too large for mechanical management.

Bush honeysuckle was observed near the disc golf trail, near the lighthouse, and sporadically throughout the campground. Plants were not managed due to time constraints as well as their widespread distribution and size.

Common buckthorn was found near the lighthouse, but plants were too large for mechanical management.

Garlic mustard was mapped at sites 14 and 16; however, infestations had already gone to seed and were not managed (Figure 23).



Purple loosestrife was mapped and managed along the stairs from site 35 and at site 58. In total, 77 plants were removed (Figure 24). However, additional infestations were detected that were beyond the point of mechanical control.

Reed canary grass was mapped at the base of the stairs near site 35 but was not managed.

Wild parsnip is abundant throughout much of the campground, especially on the steep banks along the access road to the boat launch, and at sites 3, 5, 6 and 15. In total, 359 plants were removed from five locations within the campground. However, complete management was not possible due to time constraints. There has been a steady increase in the number of wild parsnip plants removed each year since 2016 (Figure 25).

Yellow iris was documented and managed from 2014 to 2017 but was not observed in 2018 (Figure 26).

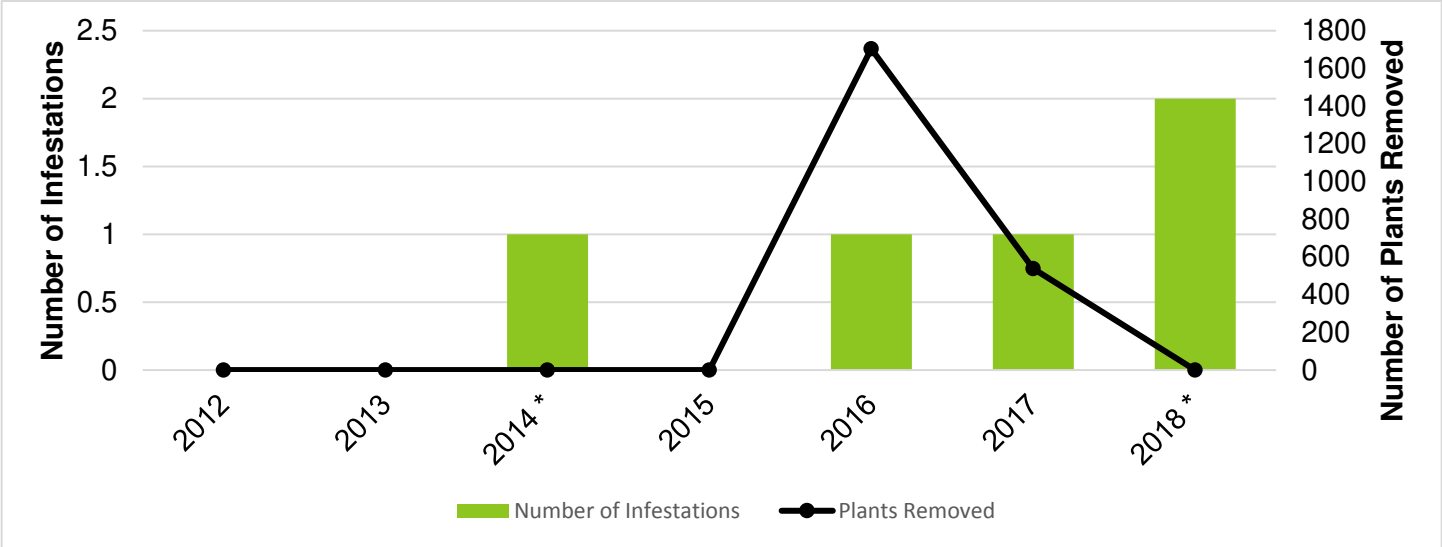


*Figure 23. Garlic mustard distribution and management progress at Crown Point Campground. * indicates years in which control of all known infestations was not completed.*

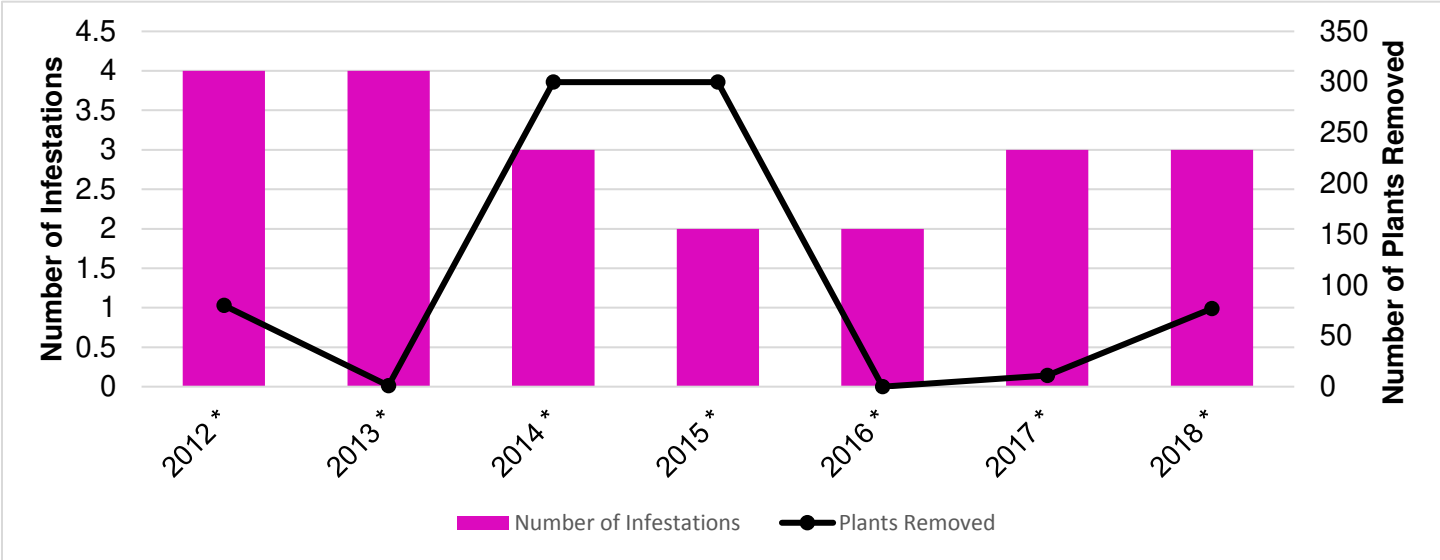


*Figure 24. Purple loosestrife distribution and management progress at Crown Point Campground. * indicates years in which control of all known infestations was not completed.*

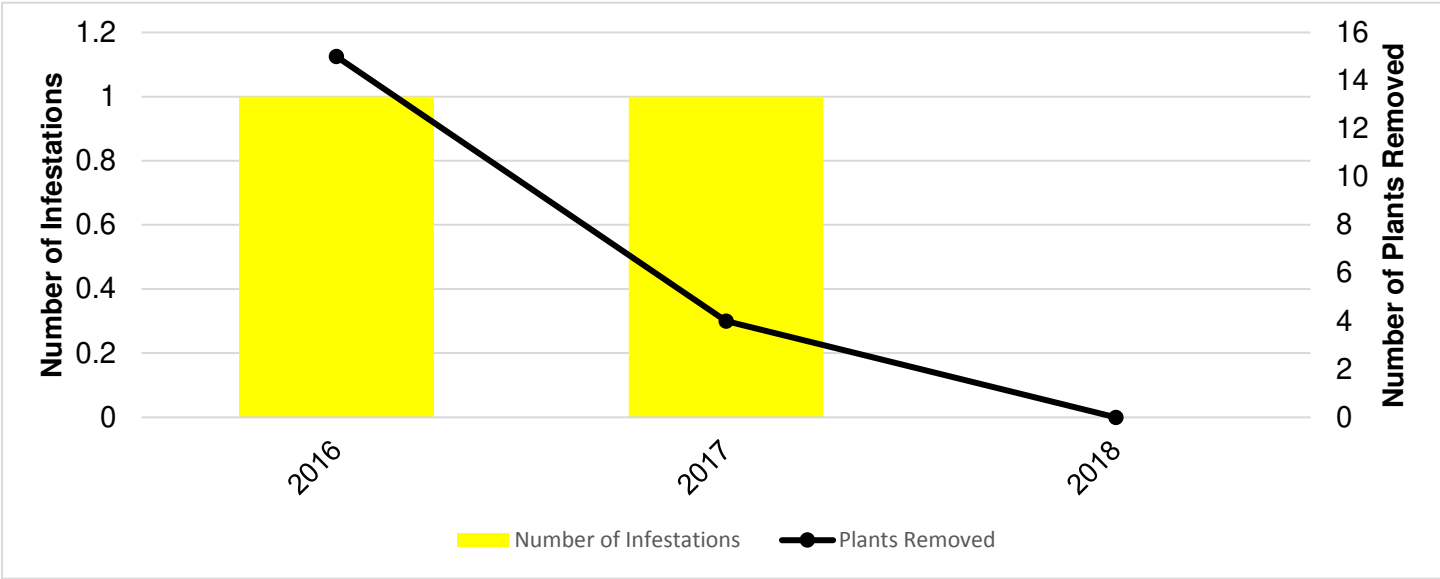


Figure 25. Yellow iris distribution and management progress at Crown Point Campground.

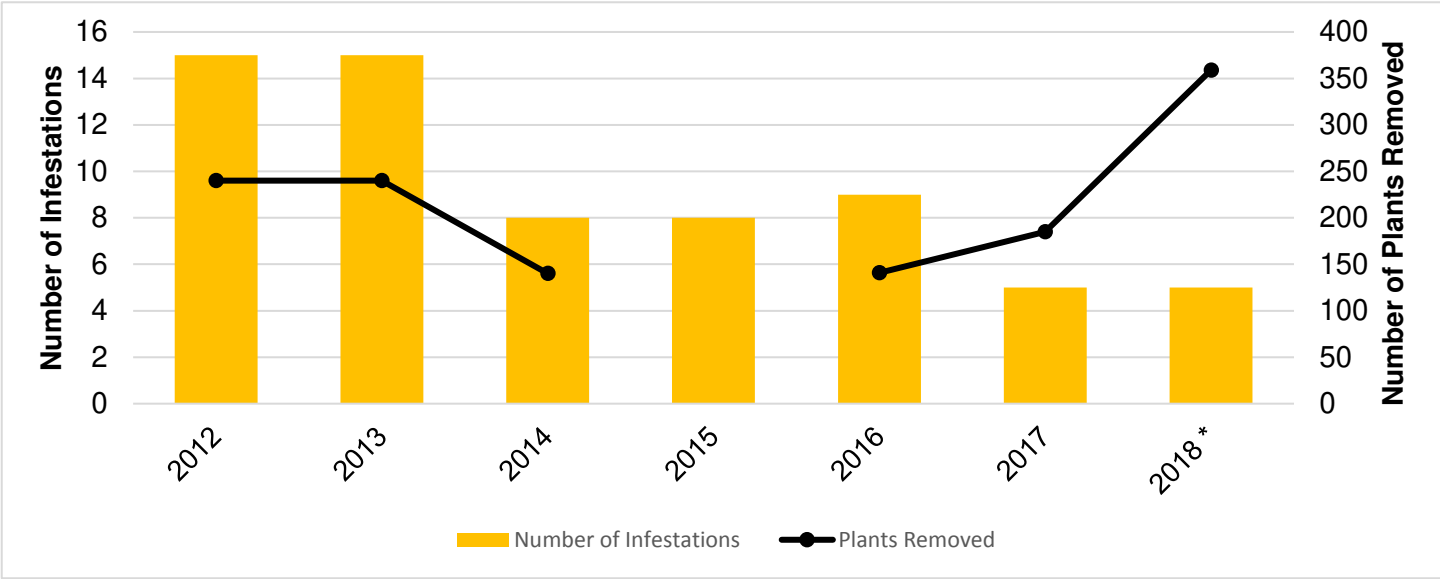


*Figure 26. Wild parsnip distribution and management progress at Crown Point Campground. * indicates years in which control of all known infestations was not completed.*

Recommendations:

Garlic mustard could not be managed in 2018 because plants had already gone to seed. This site should be visited earlier in 2019 to ensure there is adequate time to complete all surveys and management work. Purple loosestrife has remained widespread at this facility since intensive survey efforts began in 2012. Since the abundance of plants is beyond the threshold of mechanical control, this facility should be prioritized for biocontrol release in 2019. Wild parsnip remains abundant throughout the campground despite intermittent management since 2012. The spread of wild parsnip within the facility has been exacerbated by mowing during seed set. Outreach to campground staff should be conducted to raise awareness of invasive plant best management practices. Reed canary grass was mapped at the campground for the first time in 2018. This species can be monitored for spread but is not a management priority. Woody species including autumn olive, bush honeysuckle and common buckthorn are abundant at Crown Point. These species are also abundant in the surrounding landscape and are likely to reinvade following management.

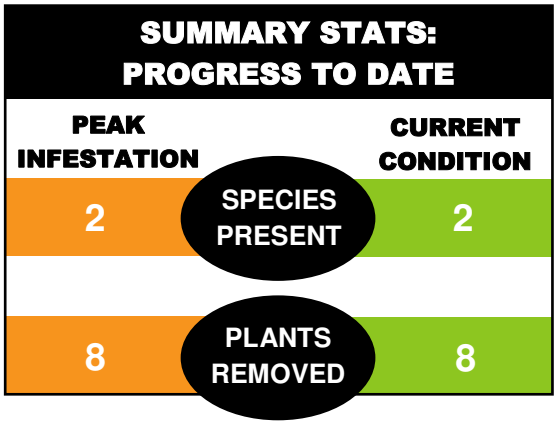
Crown Point Campground
Photo Credit: The Outdoor Project

Fish Creek Pond

Invasive Species Distribution and Management Overview:

Bush honeysuckle was observed growing sporadically throughout the campground, but was not managed due to time constraints, its distribution, and the size of plants.

Purple loosestrife was mapped and managed in a wet grassy area across from site 182. In total, seven plants were removed (Figure 27). This marks the first-year purple loosestrife was observed since 2014.



Recommendations:

Bush honeysuckle is widespread throughout the campground and should be addressed only after management of higher priority species is complete. However, since this species can be spread long distances via bird dispersed seed, reintroduction is likely.

Purple loosestrife was detected at the campground for the first time since 2014. Plants were mapped and removed from the same location as the 2014 infestation and likely emerged from the seedbank or remnant rootstock. This location should be a high priority for follow-up surveys and management to ensure full eradication of the infestation. With continued management, purple loosestrife can likely be locally eradicated from the campground.

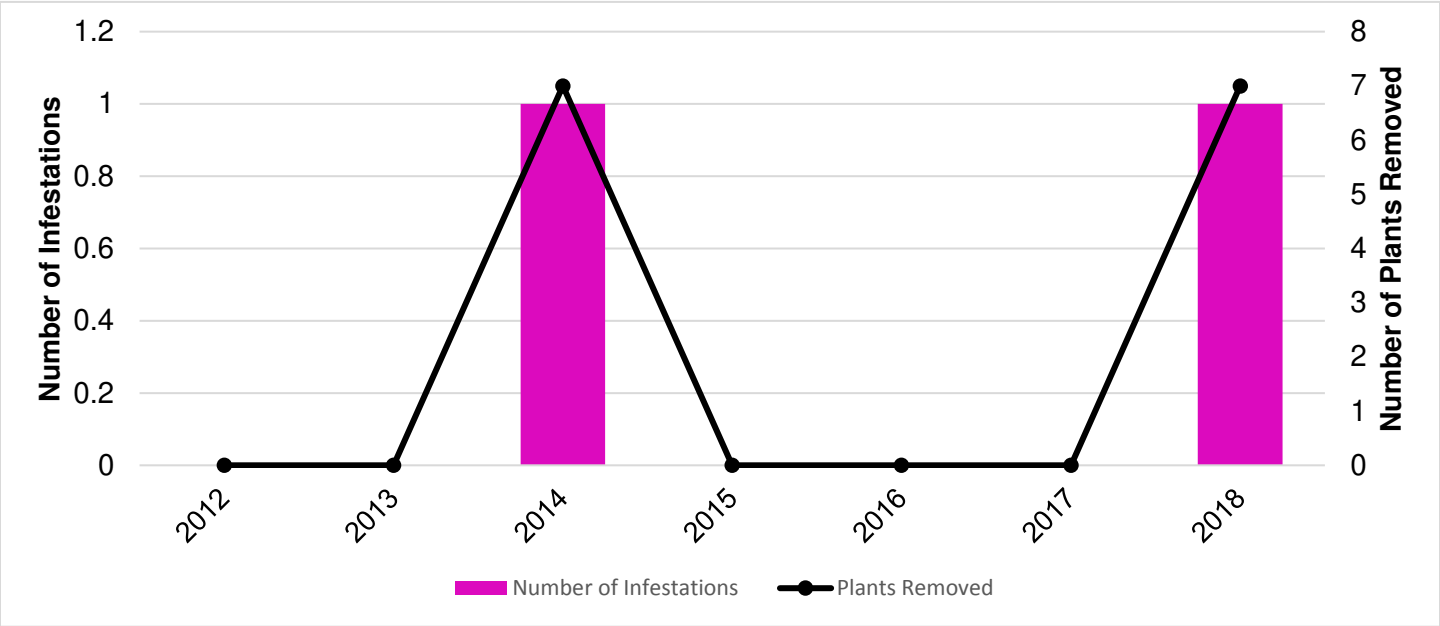


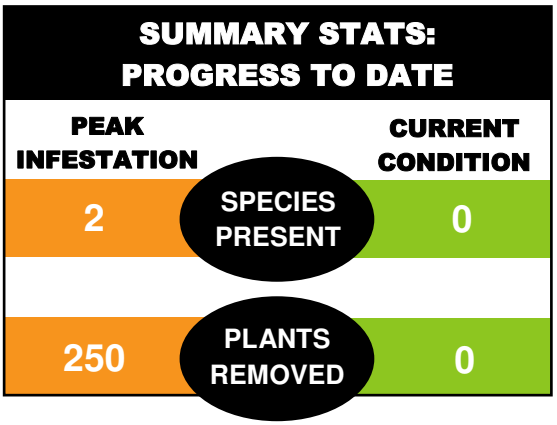
Figure 27. Purple loosestrife distribution and management progress at Fish Creek Pond Campground.

Lake Eaton

Invasive Species Distribution and Management Overview:

Bush honeysuckle was not observed in the campground for the first time in 2018. Historically, scattered plants have been mapped and managed.

Garlic mustard was not observed at the campground in 2018 and is considered locally eradicated (Figure 28).



Recommendations:

Although garlic mustard has been locally eradicated from this campground, surveys should continue to increase opportunities for early detection and rapid response. Special attention should be given to historically invaded sites, including: 29, 92, 105, 106 and 108.

Bush honeysuckle should be managed, if detected, to exclude it from the facility. Reintroduction is likely since this species can be spread long distances via bird dispersed seeds.

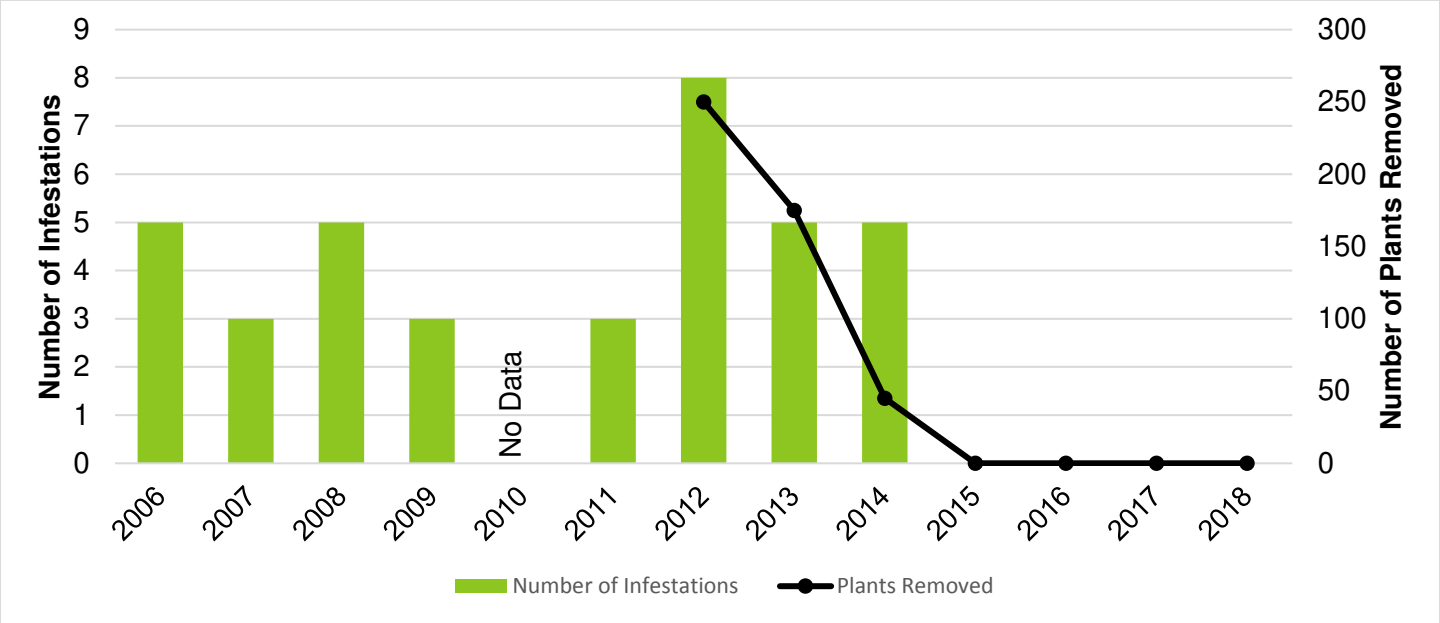


Figure 28. Garlic mustard distribution and management progress at Lake Eaton Campground.

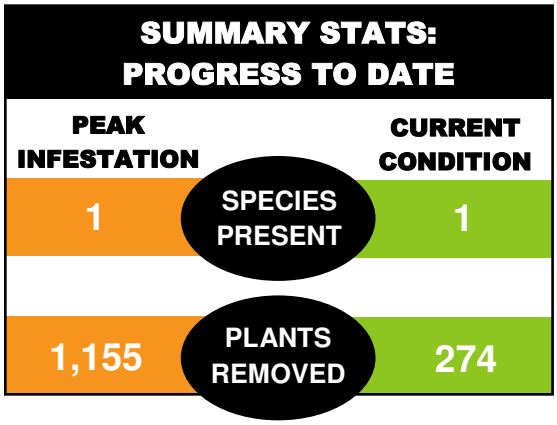
Lake Harris

Invasive Species Distribution and Management Overview:

Purple loosestrife was mapped and removed along the lakeshore between sites 12-20 and near the beach/boat launch area. In total, 274 purple loosestrife plants were pulled from two locations within the campground. This represent a slight increase from the total number of plants removed in 2017; however, it is still less than the peak infestation levels documented in 2012 when over 1,100 plants were removed from two locations (Figure 29).

Recommendations:

Purple loosestrife remains the only target invasive species present at this facility. Abundance has decreased by 76% from peak levels documented in 2012. The largest infestation occurs within a dense patch of alders that restricts access and makes management difficult. For several years, this thick growth has precluded management of the entire infestation. This is reflected in the count of total plants removed, which has remained relatively constant or increased slightly from 2016 through 2018. To address this challenge, this site should be prioritized for biological control to suppress unmanaged, inaccessible plants.



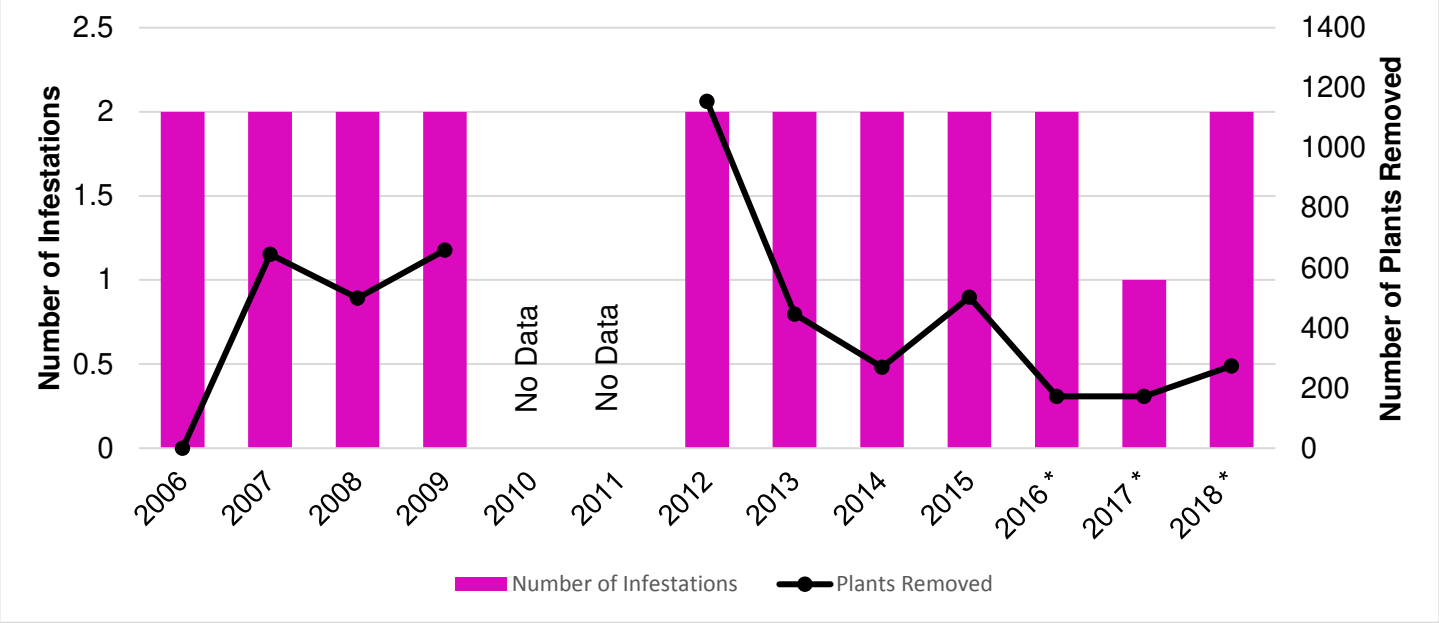


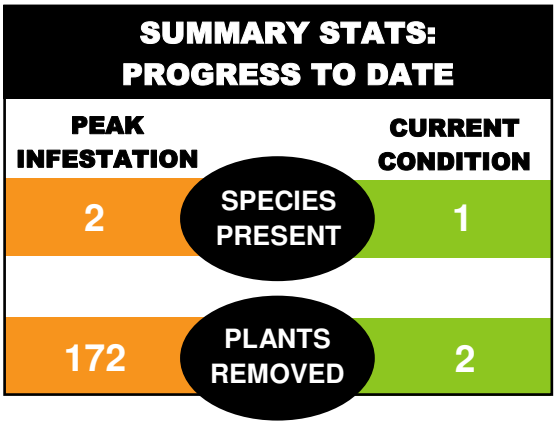
*Figure 29. Purple loosestrife distribution and management progress at Lake Harris Campground. * indicates years in which control of all known infestations was not completed.*

Lincoln Pond

Invasive Species Distribution and Management Overview:

Garlic mustard was not observed in 2018, marking two consecutive years of absence (Figure 30).

Purple loosestrife was found along the forest edge leading to the boat rental area. In total, only two plants were removed from the campground in 2018. This marks a significant decrease in peak infestation levels observed in 2015 when 163 plants were removed from two locations (Figure 31).



Recommendations:

Garlic mustard was not observed in the campground for the second consecutive year. This species should remain a top survey priority to fully document local eradication and facilitate early detection and rapid response should plants remerge. With continued survey and management effort garlic mustard can likely be locally eradicated.

The total quantity of purple loosestrife removed from the campground has decreased by 98% from peak observation levels observed in 2014, with only two plants removed in 2018. With sustained survey and management effort, purple loosestrife can likely be locally eradicated from the campground.

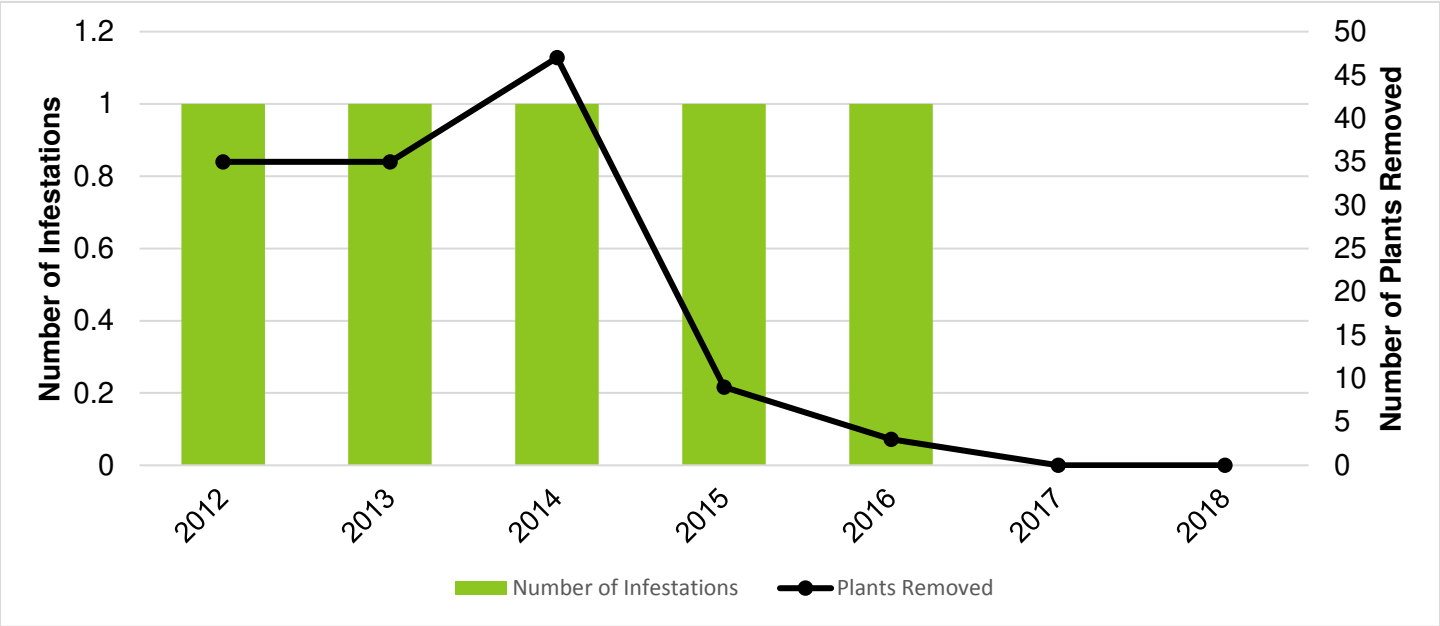


Figure 30. Garlic mustard distribution and management progress at Lincoln Pond Campground.

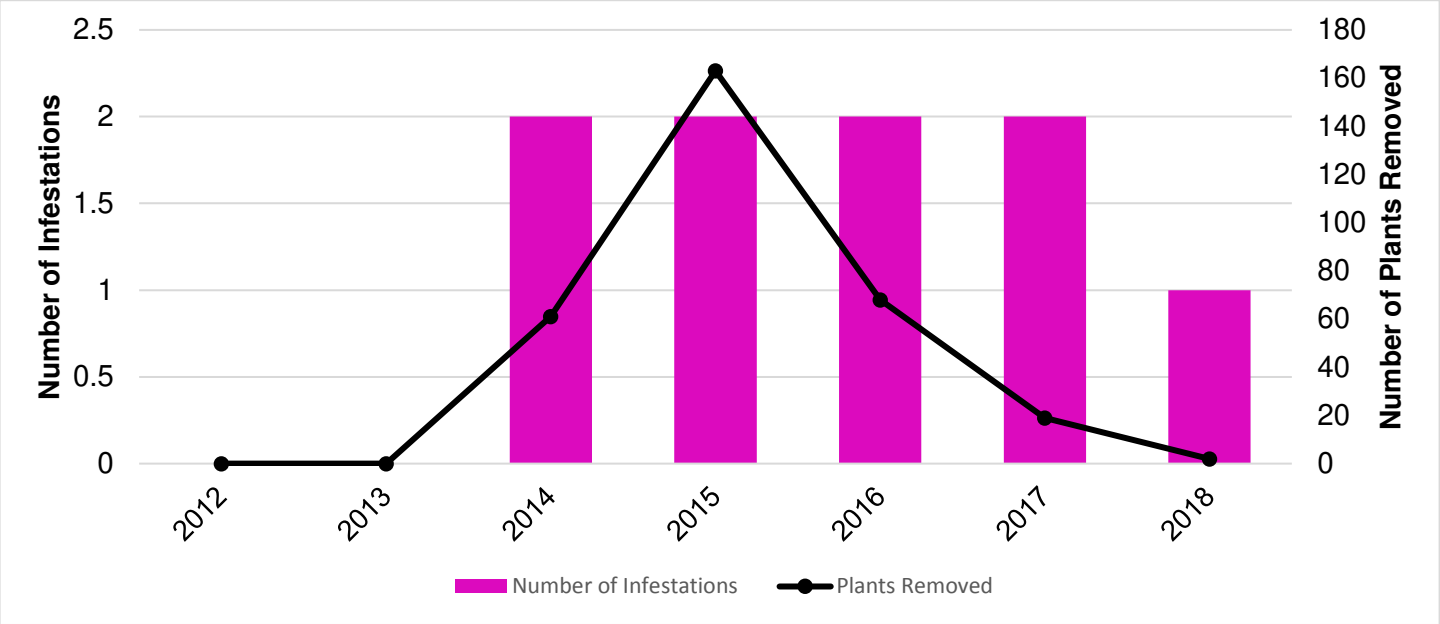


Figure 31. Purple loosestrife distribution and management progress at Lincoln Pond Campground.

Lincoln Pond Campground
Photo Credit: See/Swim

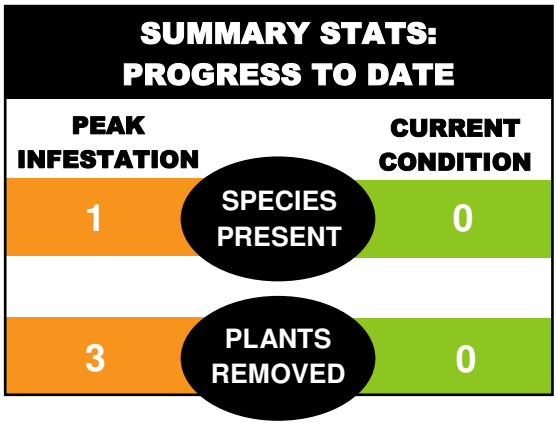
Meacham Lake

Invasive Species Distribution and Management Overview:

Garlic mustard was last mapped and managed at the campground in 2006 but has not been observed since (Figure 32). This species is locally eradicated.

Recommendations:

Garlic mustard has been absent from the campground for 11 consecutive years and is considered locally eradicated. Survey efforts should continue to quickly detect and address reemergence or introductions of new terrestrial invasive plants.



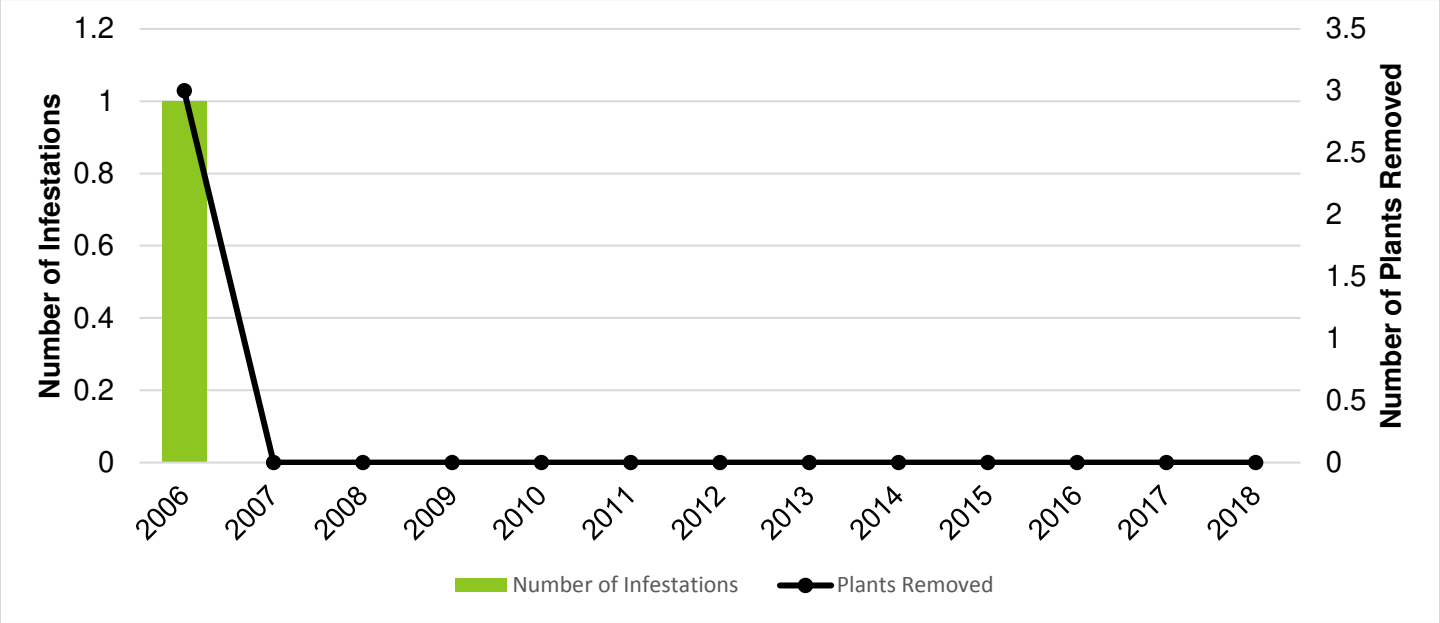


Figure 32. Garlic mustard distribution and management progress at Meacham Lake Campground.

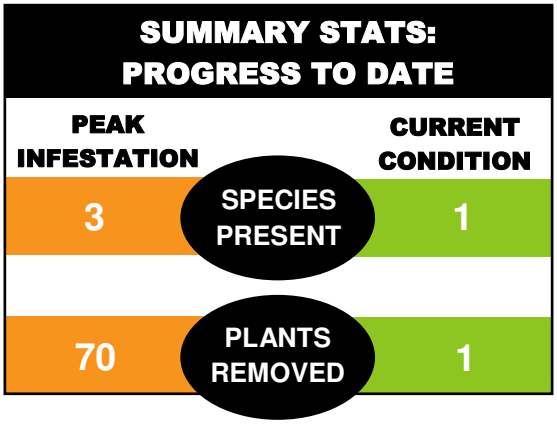
Meadowbrook

Invasive Species Distribution and Management Overview:

Bush honeysuckle is found sporadically throughout the campground. It was mapped at sites 23, 29 and along the trail to Scarface Mountain. Most plants were not managed due to the species widespread distribution in the surrounding area.

Garlic mustard was not observed in 2018 and is considered locally eradicated (Figure 33).

Japanese barberry was not observed in 2018. It was last documented in 2015, when two shrubs were removed.



Recommendations:

Bush honeysuckle is widespread throughout the campground and should be addressed only after management of higher priority species is complete. However, since this species can be spread long distances via bird dispersed seed, reintroduction is likely.

Garlic mustard has been absent from this campground for five consecutive years. Survey efforts should continue to facilitate early detection and rapid response should reemergence occur. Additional effort should be dedicated to surveying undeveloped portions of the campground to ensure there are not undetected source infestations.

Isolated Japanese barberry plants were detected and removed in 2015 and have not returned. Survey and management efforts should focus on maintaining the exclusion of this species.

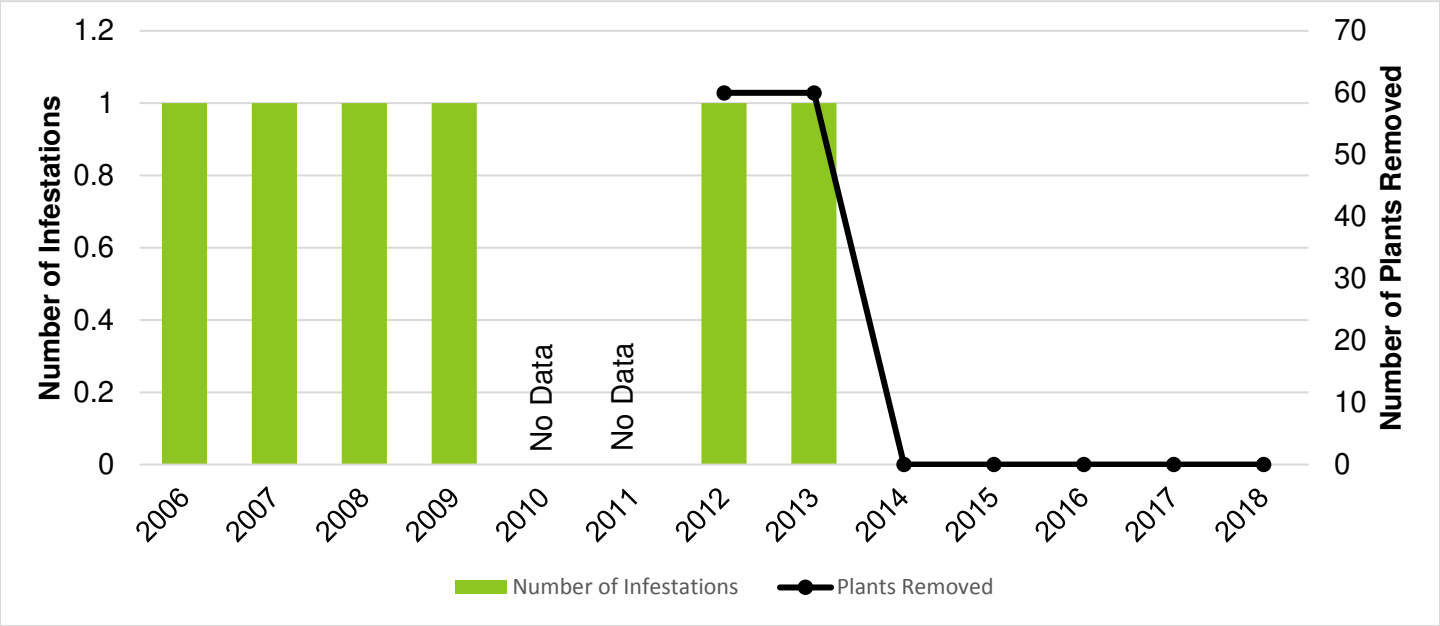


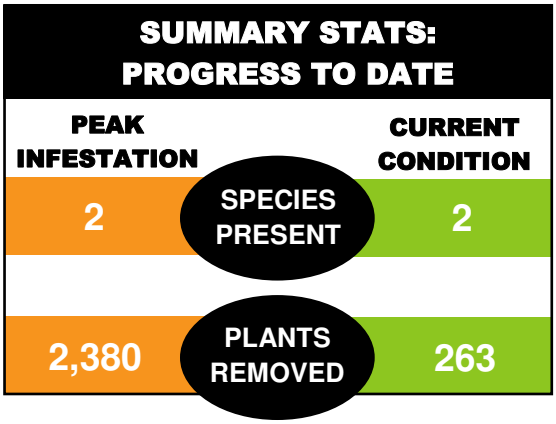
Figure 33. Garlic mustard distribution and management progress at Meadowbrook Campground.

Paradox Lake

Invasive Species Distribution and Management Overview:

Garlic mustard was mapped and removed from site 48. In total, seven plants were removed from one location within the campground. This marks a significant decrease from peak infestation levels documented in 2014 when 2,200 plants were removed from eight locations (Figure 34).

Purple loosestrife was mapped and removed from the campground boat launch area. In total, 256 plants were removed. Annual distribution and abundance has fluctuated historically, with no clearly discernible management trend (Figure 35).



Recommendations:

Garlic mustard distribution and abundance have decreased by 99% from peak infestation levels observed in 2014. With sustained survey and management efforts, garlic mustard can likely be locally eradicated. Additional effort should be dedicated to surveying undeveloped portions of the campground to ensure there are not undetected source populations.

The quantity of purple loosestrife removed from the facility annually has fluctuated since project inception. The driver for this variability is unclear, but alternative or supplemental management techniques, such as the use of biological controls, should be considered in 2019.

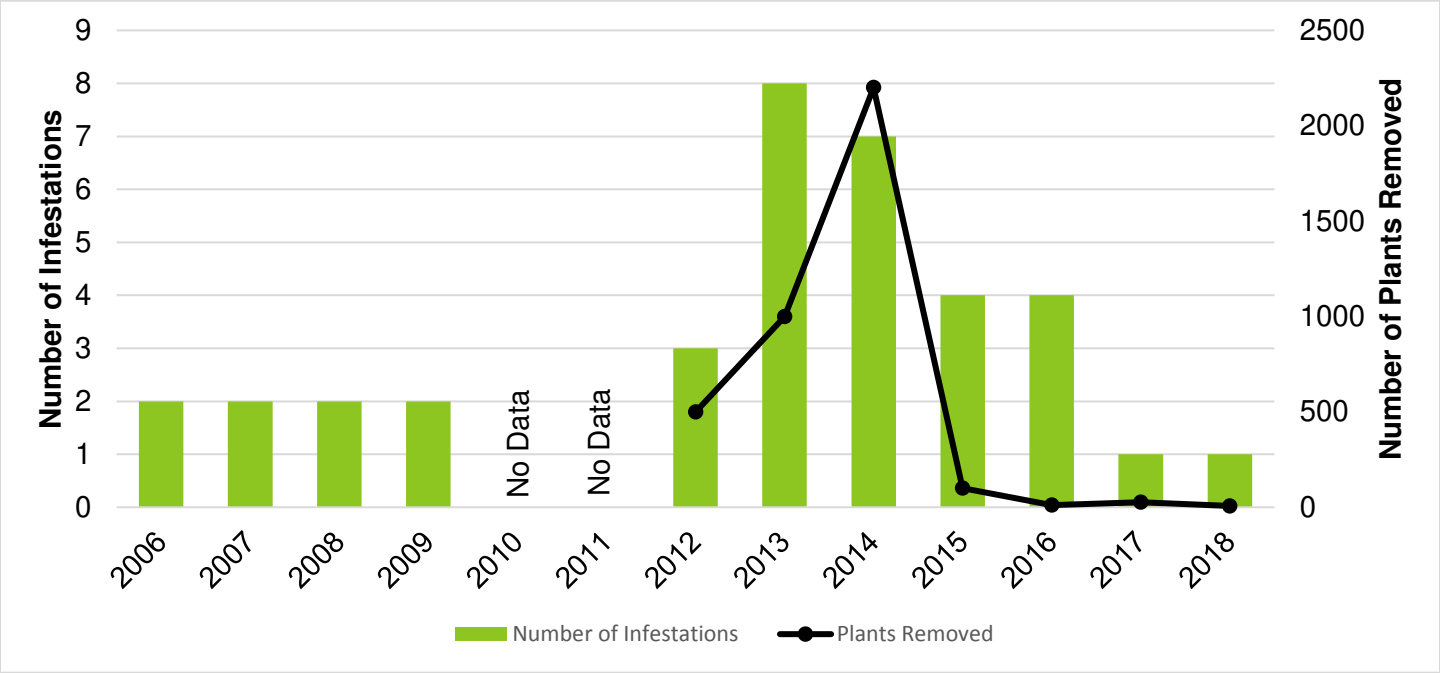


Figure 34. Garlic mustard distribution and management progress at Paradox Lake Campground.

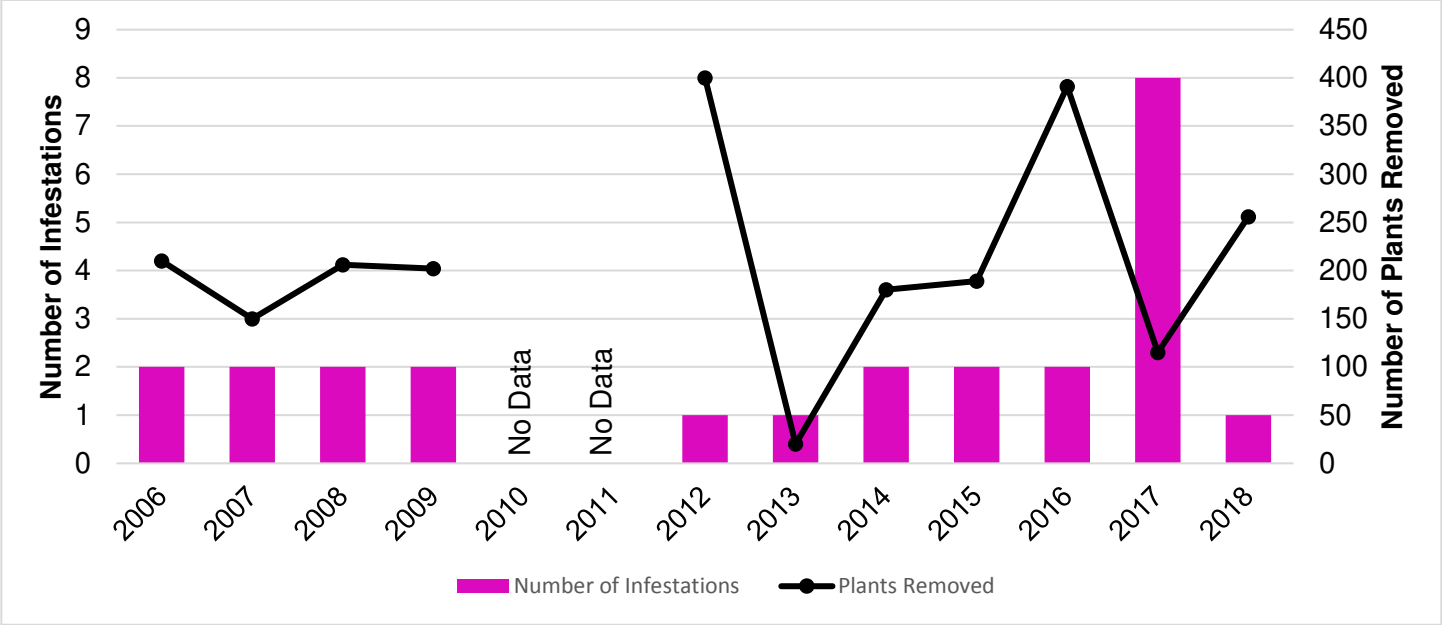


Figure 35. Purple loosestrife distribution and management progress at Paradox Lake Campground.

Poke-O-Moonshine

Invasive Species Distribution and Management Overview:

This facility is no longer administered as a public campground. However, it is open and frequently visited as a day use facility by land-based outdoor recreationalists. No invasive species were detected at this location in 2018.

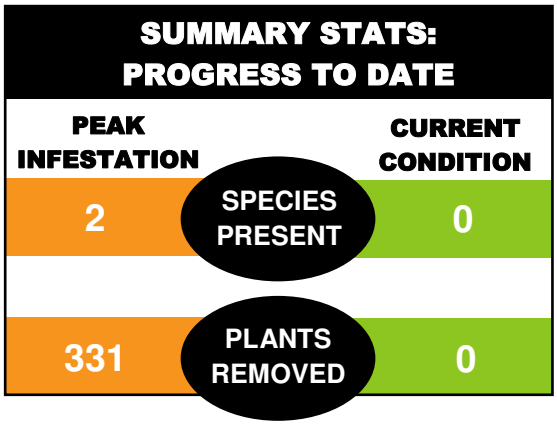
Paradox Lake Campground
Photo Credit: John Haywood, The Outdoor Project

Putnam Pond

Invasive Species Distribution and Management Overview:

Garlic mustard was not observed in 2018, marking two consecutive years of absence (Figure 36).

Purple loosestrife was not observed in 2018, marking two consecutive years of absence (Figure 37).



Recommendations:

Both garlic mustard and purple loosestrife have been absent from the campground for two consecutive years. These species should remain top survey priorities to facilitate early detection and rapid response to address reemergence. With sustained survey and management effort, garlic mustard and purple loosestrife can likely be locally eradicated.

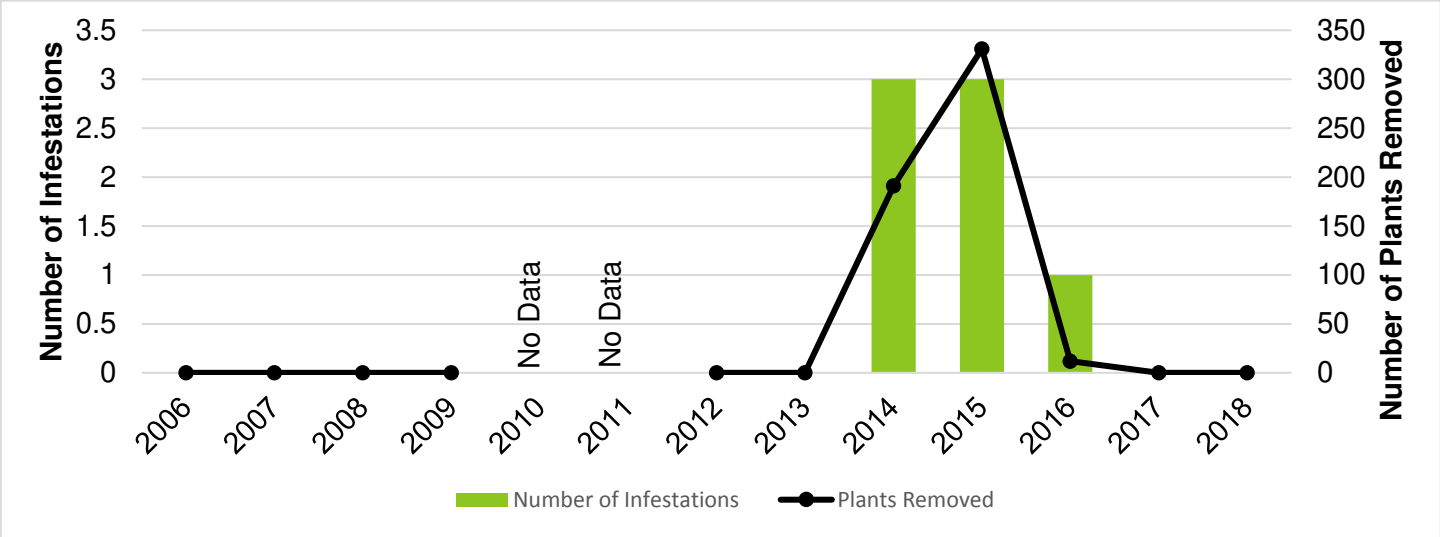


Figure 36. Garlic mustard distribution and management progress at Putnam Pond Campground.

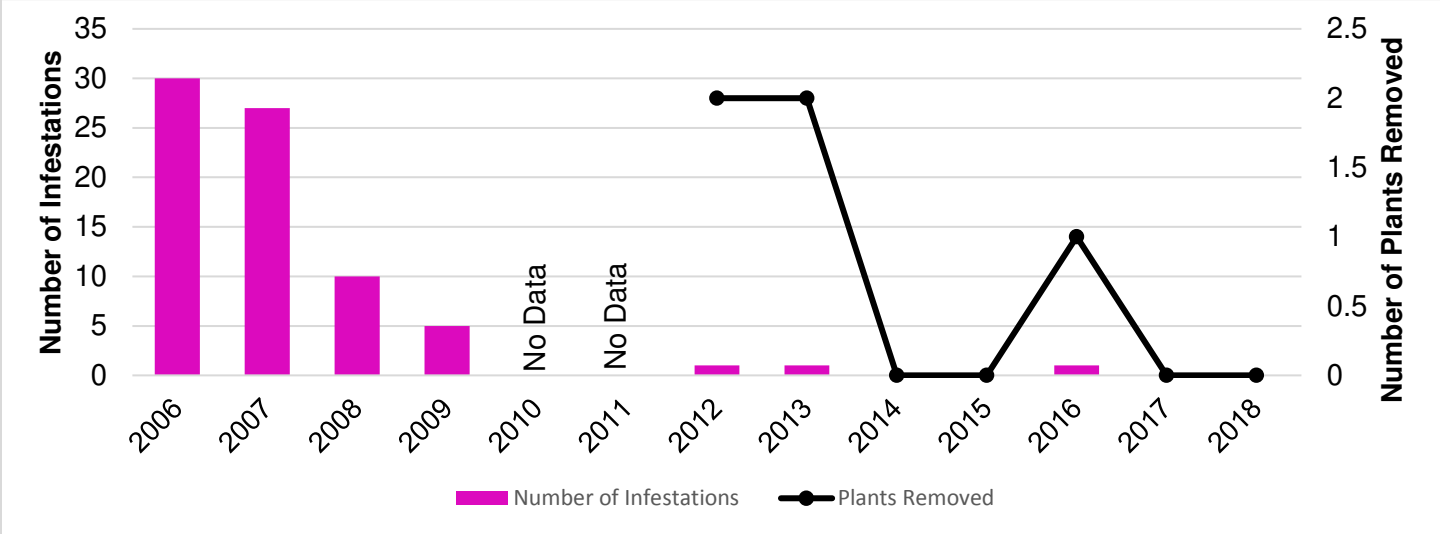


Figure 37. Purple loosestrife distribution and management progress at Putnam Pond Campground.

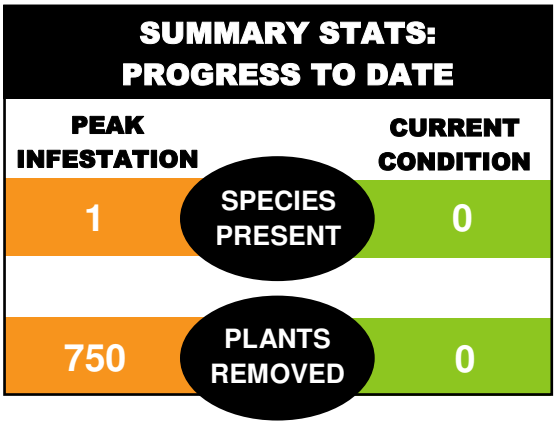
Rollins Pond

Invasive Species Distribution and Management Overview:

Garlic mustard was not detected at the campground in 2018 and is considered locally eradicated (Figure 38).

Recommendations:

Garlic mustard was not observed in 2018 and is considered locally eradicated. Annual monitoring should be conducted to facilitate early detection and rapid response to address potential reemergence. Purple loosestrife is present nearby at Fish Creek Pond campground and should be a top survey priority for Rollins Pond.



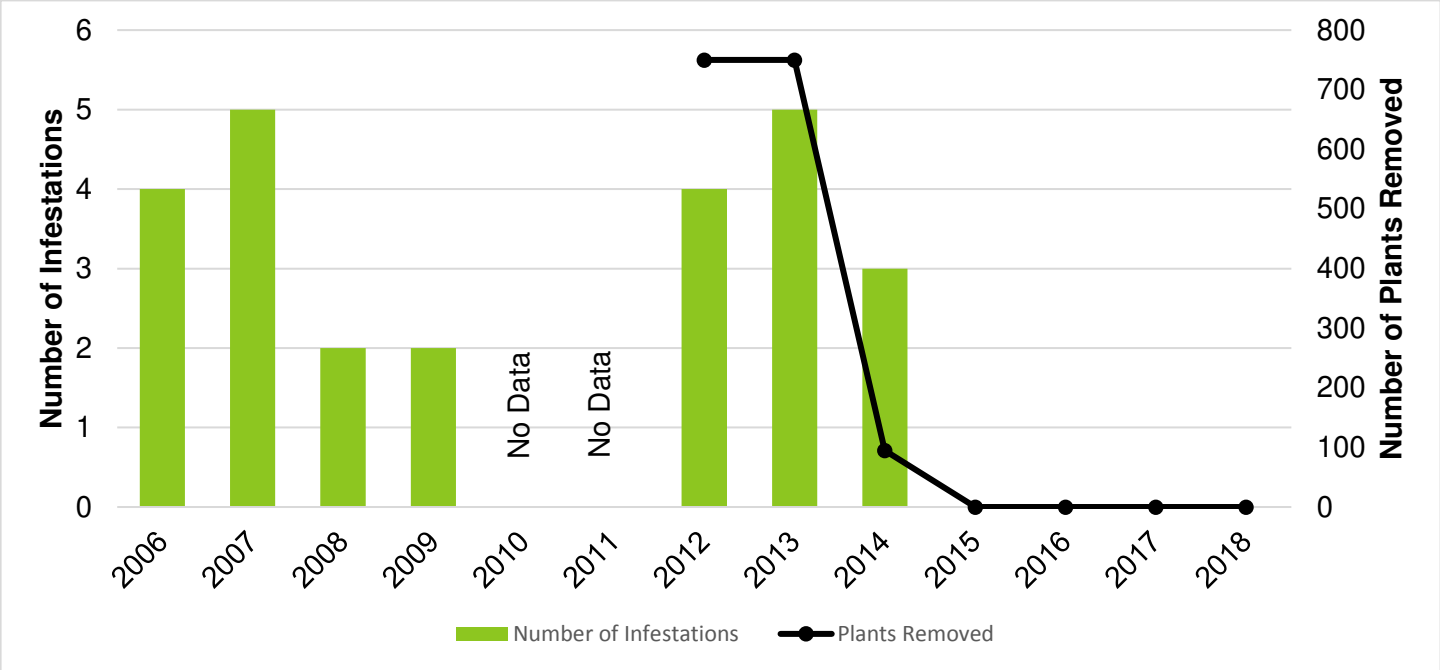


Figure 38. Garlic mustard distribution and management progress at Rollins Pond Campground.

Saranac Lake Islands

Recommendations:

This campground has never been inventoried because it is only accessible by boat. An initial survey of this campground should be performed in 2019 if time and resources are available.

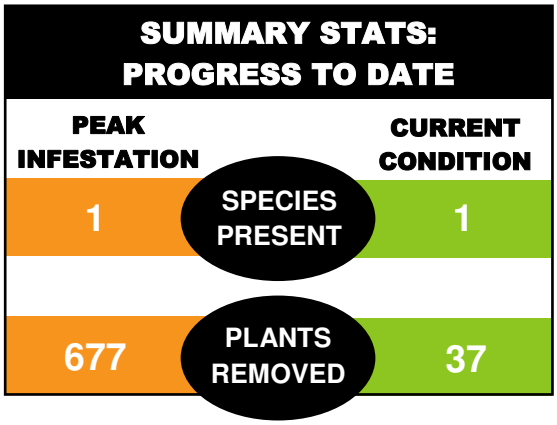
Sharp Bridge

Invasive Plant Distribution:

Purple loosestrife was mapped and removed from the shoreline between the bridge and picnic area, and near the sandbar downstream from the picnic area. In total, 37 plants were removed from these two locations, with the majority found along the shoreline. This marks a decrease from peak invasion levels observed in 2015, when 677 plants were removed (Figure 39).

Recommendations:

Purple loosestrife should remain a top survey and management priority for this location. Abundance has declined by 95% from peak infestation levels observed in 2015. With sustained effort, purple loosestrife can likely be locally eradicated. If time and resources allow, a survey along the river should be conducted to assess the distribution of purple loosestrife upstream from the campground.



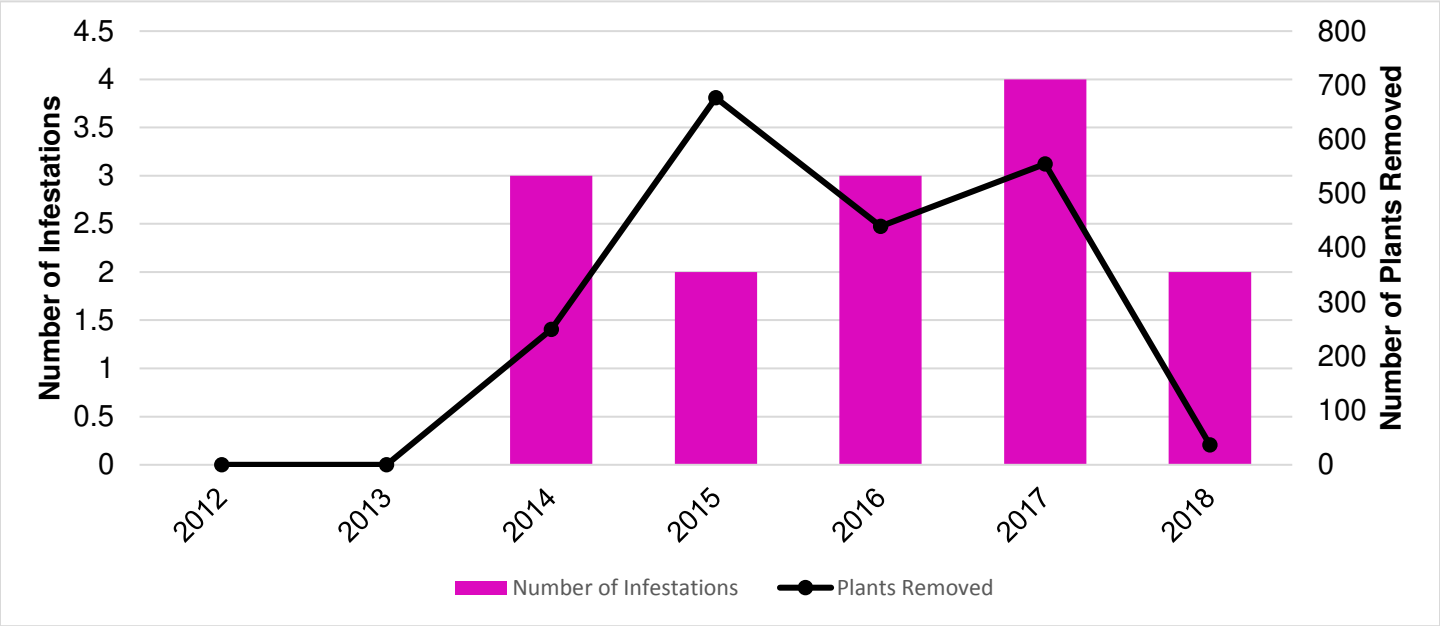


Figure 39. Purple loosestrife distribution and management progress at Sharp Bridge Campground.

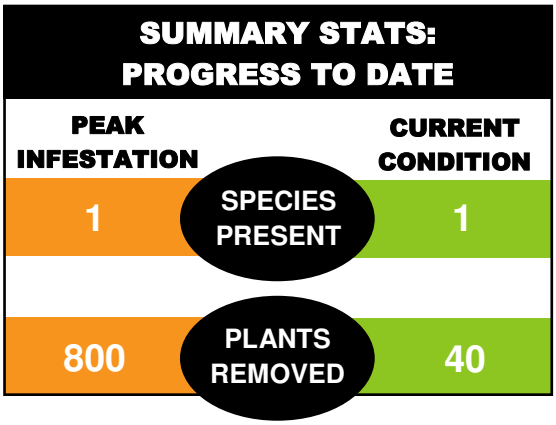
Taylor Pond

Invasive Species Distribution and Management Overview:

Purple loosestrife was mapped and removed from both sides of the path between campsites 20 and 21. In total, 40 plants were removed from two locations. This marks a significant decrease from peak infestation levels observed in 2012 when 800 plants were removed (Figure 40).

Recommendations:

The quantity of purple loosestrife removed from the campground annually has declined by 95% from peak infestation levels observed in 2012. With sustained survey and management effort, purple loosestrife can likely be locally eradicated. This campground should be monitored annually in late summer for purple loosestrife and other new invasive plant species.



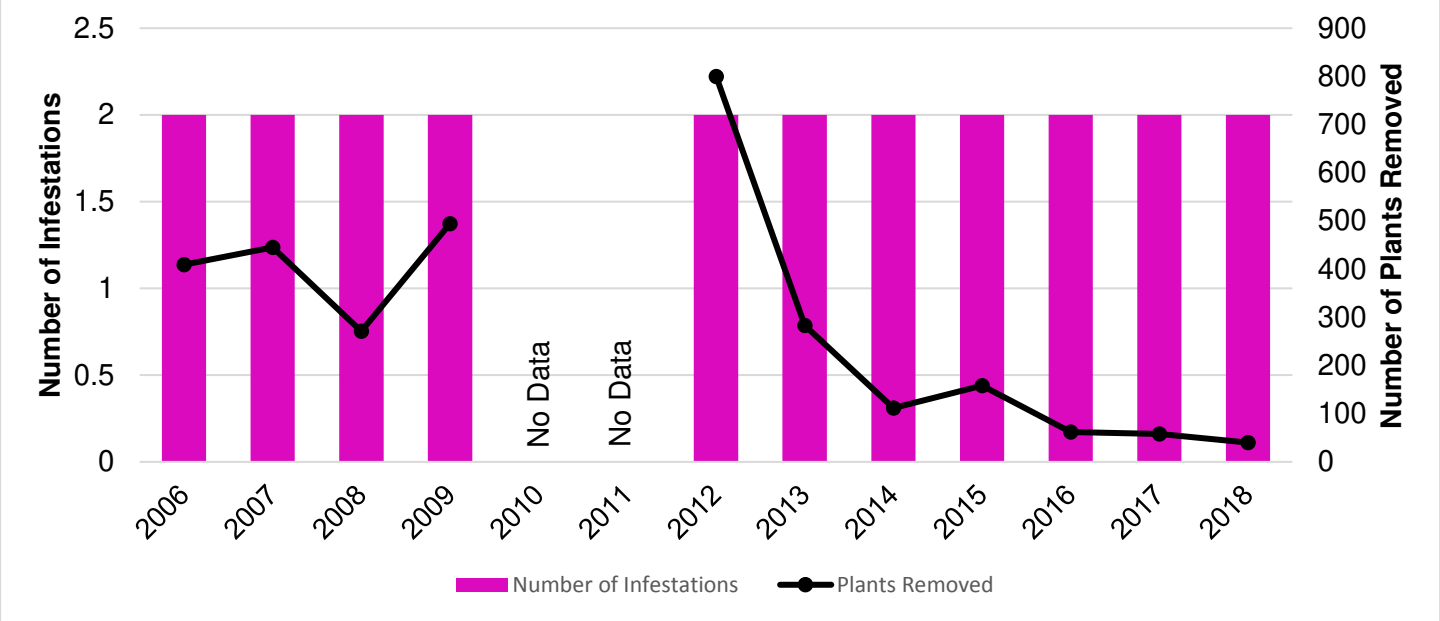


Figure 40. Purple loosestrife distribution and management progress at Taylor Pond Campground.

Wilmington Notch

Invasive Species Distribution and Management Overview:

No target invasive species were detected at this facility in 2018. This campground should be monitored annually for new infestations of invasive species.

Warrensburg Working Circle

The Warrensburg working circle contains seven campgrounds: Luzerne, Lake George Battleground, Hearthstone Point, Eagle Point, Scaroon Manor, Rogers Rock, and Lake George Islands. Six campgrounds were surveyed and managed in 2018, with target invasive species present at five facilities. The following section provides an overview of survey and management activities for these locations.

WARRENSBURG WORKING CIRCLE MANAGEMENT SUMMARY			
Campground	**Invasive Plants Present**	**Total Plants Removed**	**Density of Infestations**
Eagle Point	None Observed	N/A	N/A
Hearthstone Point	Garlic Mustard	166*	High
	Knotweed spp.	0	High
	Japanese Barberry	1	Low
	Bush Honeysuckle	0	High
	Norway Maple	0	Sparse
	Oriental Bittersweet	0	Low
Lake George Battleground	Garlic Mustard	4341*	Extreme
	Knotweed spp.	0	High
	Japanese Barberry	2	Moderate
	Oriental Bittersweet	0	High
	Bush Honeysuckle	0	High
	Norway Maple	0	Sparse
Lake George Islands	Not Inventoried in 2018		
Luzerne	Garlic Mustard	5	Sparse
	Bush Honeysuckle	1	Extreme
Rogers Rock	Garlic Mustard	0*	High
	Japanese Barberry	0	High
	Bush Honeysuckle	0	High
	Wild Parsnip	0*	Sparse
Scaroon Manor	Winged Burning Bush	0	Moderate
	Bush Honeysuckle	0	High
	Oriental Bittersweet	100	High
	Japanese Barberry	0	High

* = Plant was dead/dormant and it was too late in season for effective management.

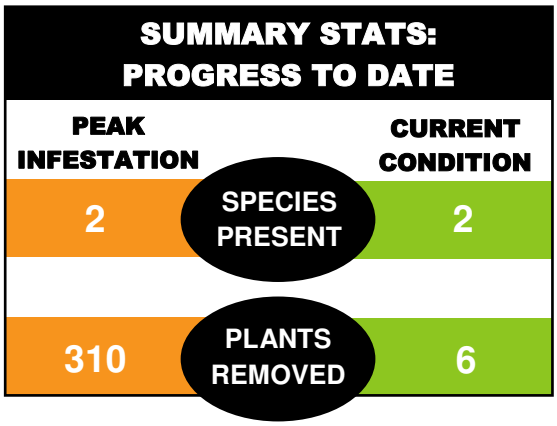
Density of Infestations:
Sparse – less than 25 plants observed across the campground
Low – 25 – 149 plants observed across the campground
Moderate – 150-500 plants observed across the campground
High – Greater than 500 plants observed across the campground
Extreme – Greater than 500 plants observed across the campground and management of the campground could not be achieved by a five-person crew in one day, or biological control measures are recommended.

Luzerne

Invasive Species Distribution and Management Overview:

Bush honeysuckle was mapped in the day use area across from the picnic pavilion but is found throughout the campground. One isolated plant was removed, but most infestations were not managed due to the species widespread distribution and size of plants.

Garlic mustard was mapped and removed near the shower building and across from where the dirt road joins the main road. In total, five garlic mustard plants were removed from two locations within the campground. This marks a significant decrease from peak infestation levels observed in 2015, when 310 plants were removed from four locations (Figure 41).



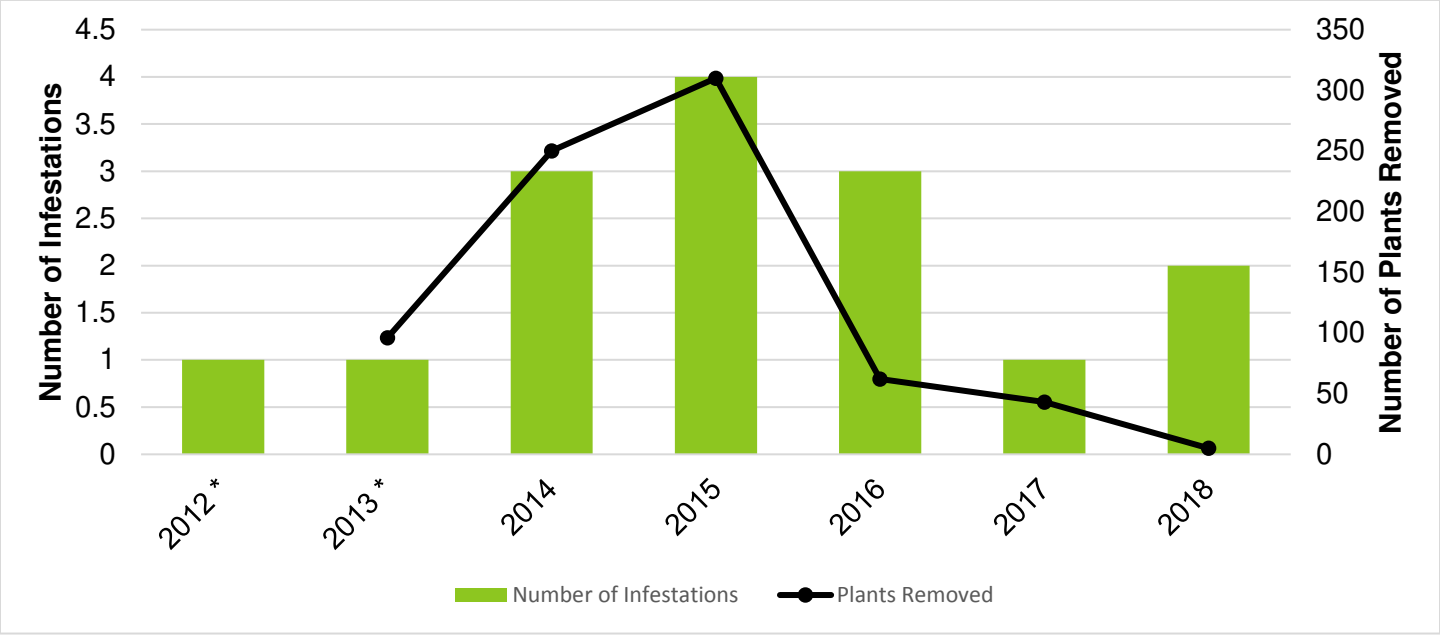


*Figure 41. Garlic mustard distribution and management progress at Luzerne Campground. * indicates years in which control of all known infestations was not completed.*

Recommendations:

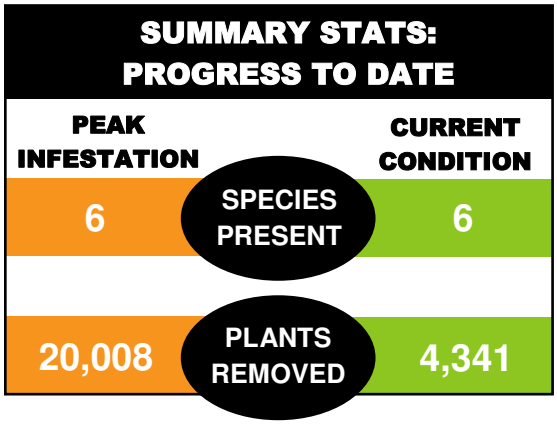
Bush honeysuckle is widespread throughout the campground and many plants are too large to remove by pulling or digging. Small, isolated plants can be removed to suppress the infestation, but only after management of higher priority species has been completed. Garlic mustard abundance has decreased by 98% from peak infestations levels observed in 2015. With sustained survey and management effort, garlic mustard can likely be locally eradicated.

Lake George Battleground

Invasive Species Distribution and Management Overview:

Bush honeysuckle is widespread throughout the campground. It was not managed due to time constraints, its widespread distribution, and the size of plants.

Garlic mustard was mapped near sites 10, 12, 14, 16, 19, 20, behind the recycling center and behind sites 8-19. The largest infestations were located behind the recycling center and behind sites 8-19. Many infestations had already gone to seed and could not be managed in 2018. In total, 4,341 plants were pulled from eight locations within the campground (Figure 42). While the total number of plants removed is significantly less than the previous season, this is primarily a reflection of incomplete management due to plant phenology.



Japanese barberry was mapped and removed near sites 50 and 54. Two plants were pulled and left onsite to decompose.

Knotweed spp. were mapped in the back of the campground, extending onto private property. Mechanical control of knotweed is generally not effective, so no management was performed.

Norway maple was mapped at site 58, but not managed.

Oriental bittersweet was observed next to site 46 and in the area behind sites 8-19 but was not managed due to time constraints.

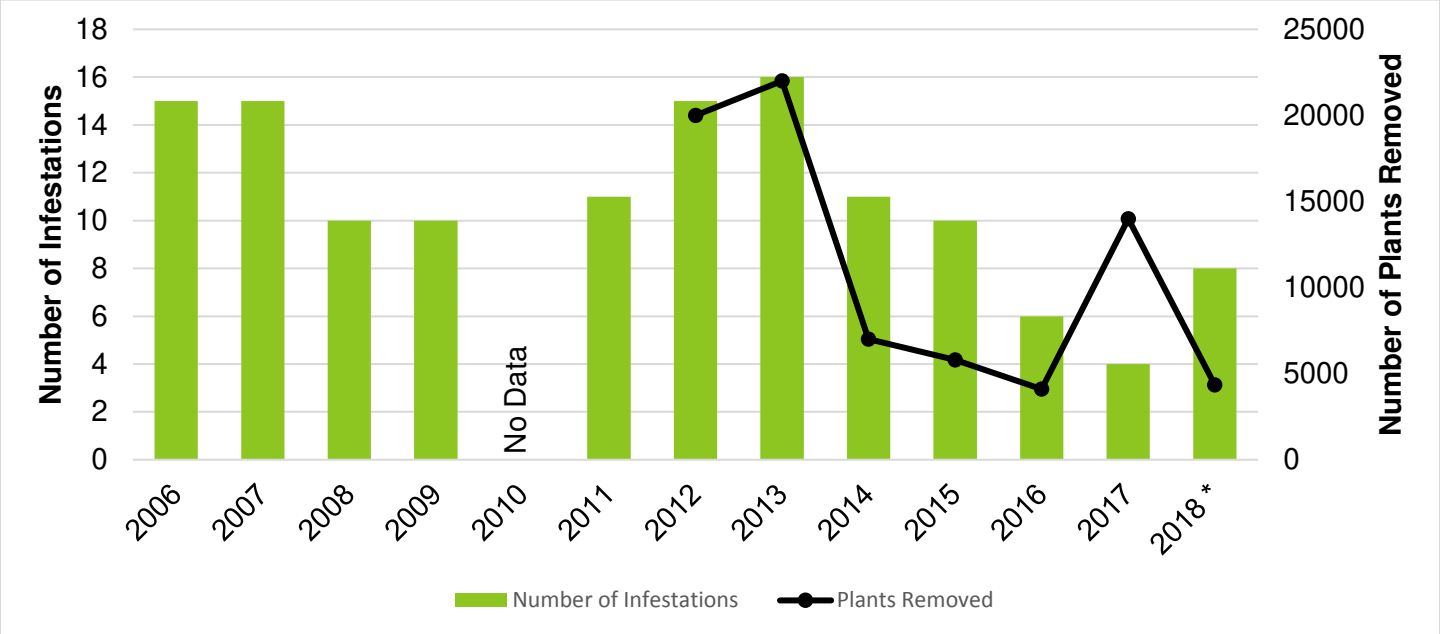


*Figure 42. Garlic mustard distribution and management progress at Lake George Battleground Campground. * indicates years in which control of all known infestations was not completed.*

Recommendations:

Bush honeysuckle, oriental bittersweet, and Norway maple are widespread throughout the campground and surrounding landscape and are not high priorities for management.

This campground has the most extensive garlic mustard infestation of all locations surveyed in 2018. Management of all infestations was not completed, as many plants had already gone to seed. This facility should be visited earlier in 2019 to ensure there is adequate time to survey and manage all infestations. In previous years, an SCA crew has assisted with management at this site, although this resource was not available in 2018. This partnership should be continued in 2019, if possible.

The knotweed infestation should be monitored annually and treated with herbicide by APIPP's response team once appropriate landowner permission is attained.

Japanese barberry remains limited in distribution and should be targeted for containment/exclusion if time and resources allow following garlic mustard management.

Offering an invasive species identification and management seminar for the campground staff would be useful, if time and resources are available. This would increase awareness among staff about invasive plants, and their assistance could contribute to the success of future management efforts.

Lake George Battleground
Photo Credit: HipCamp

Hearthstone Point

Invasive Species Distribution and Management Overview:

Autumn olive was documented for the first time in the campground in 2017 but was not observed this season.

Bush honeysuckle is widespread throughout the campground and was not managed due to time constraints, its distribution, and the size of plants.

Garlic mustard was mapped and removed from site 70, 219, and the spoils area. In total, 166 plants were removed from three locations (Figure 43). An additional infestation was mapped but could not be managed because the plants had already gone to seed.

Japanese barberry was mapped near site 64 and the beach. An additional infestation was mapped and removed near the fence on the south end of the campground.

Knotweed spp. were mapped down the road from site 73 and in the spoils area. Mechanical control of knotweed is generally not effective, so no management was performed.

Multiflora rose was documented and managed for the first time in the campground in 2017 but was not observed this season.

Norway maple was mapped at site 70 but was not managed.

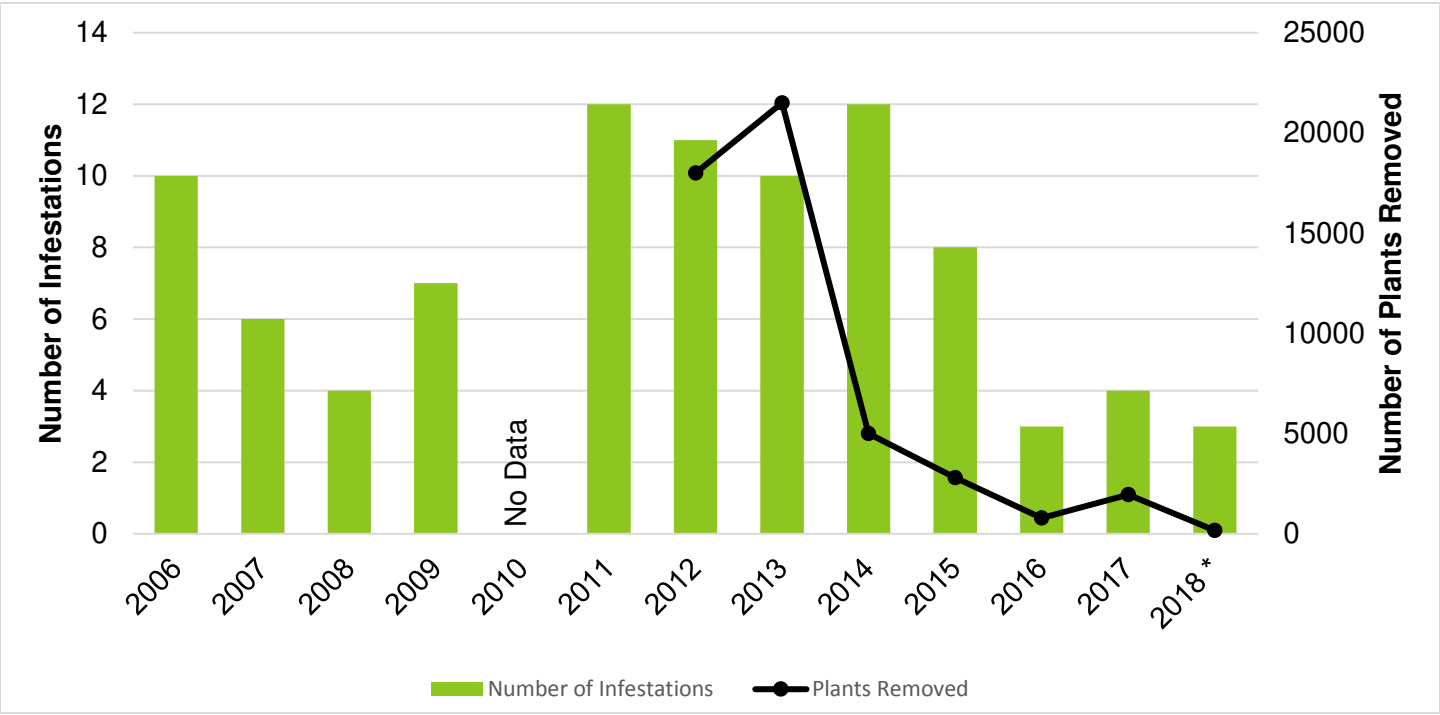


*Figure 43. Garlic mustard distribution and management progress at Hearthstone Point Campground. * indicates years in which control of all known infestations was not completed.*

Oriental bittersweet was mapped in the spoils area, but not managed due to time constraints, its widespread distribution, and the size of plants.

Winged burning bush was documented and managed at this campground for the first time in 2017 but was not observed this season.

Recommendations:

Garlic mustard should remain the top survey and management priority for this campground. All infestations could not be managed in 2018 because plants had already gone to seed. This facility should be visited earlier in 2019 to ensure there is adequate time to survey and manage all infestations. The dense knotweed infestation located at the spoils area should be treated with herbicide by APIPP's terrestrial response team to limit its continued spread into the campground.

Bush honeysuckle, oriental bittersweet, and Norway maple are widespread throughout the campground and are not high priorities for management. Japanese barberry is found in lower abundance and can be controlled only after management of higher priority species is complete. However, since these woody species can be spread long distances via bird dispersed seed, reintroduction is likely.

Autumn olive, winged burning, and multiflora rose were not observed at the campground in 2018 but have been documented in previous years. Survey efforts should target these species to fully document local eradication and address potential reemergence.

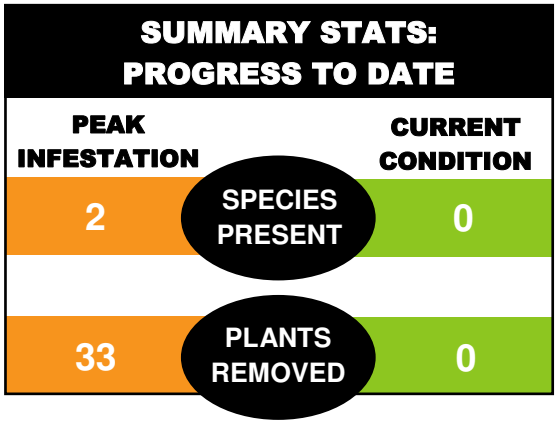
Hearthstone Point Campground
Photo Credit: See/Swim

Eagle Point

Invasive Species Distribution and Management Overview:

Bush honeysuckle was found at this campground for the first time in 2017 but was not detected in 2018.

Garlic mustard was not detected in 2018, marking two consecutive years of absence (Figure 44).



Recommendations:

No target invasive species were observed at this campground in 2018. Both bush honeysuckle and garlic mustard were documented in previous seasons but have been successfully controlled. Survey efforts should continue to fully document local eradication and quickly detect and address potential species reemergence. Purple loosestrife is known to exist within close proximity to this facility and should be a high priority for early detection surveys.

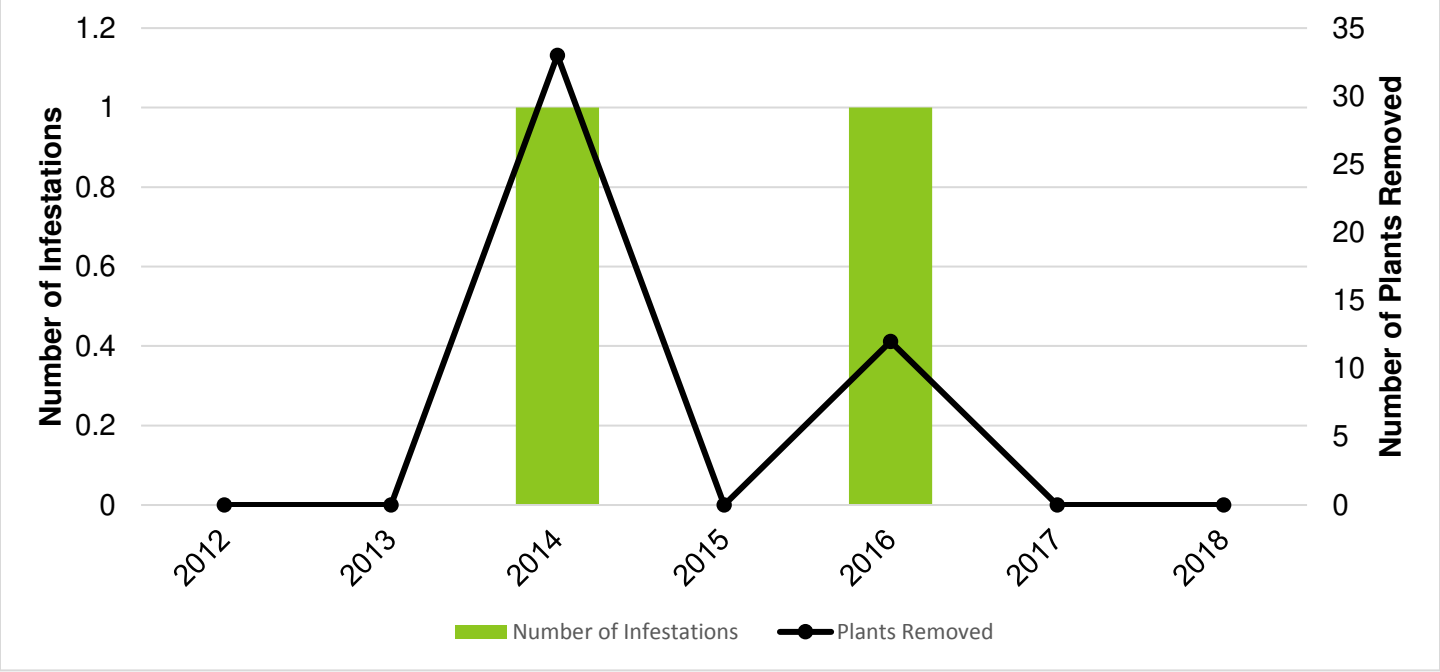


Figure 44. Garlic mustard distribution and management progress at Eagle Point Campground.

Scaroon Manor

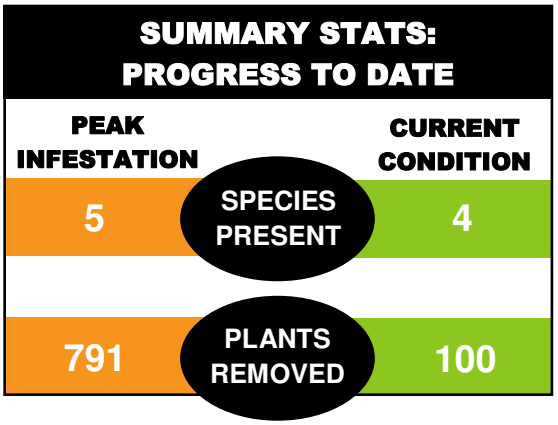
Invasive Species Distribution and Management Overview:

Bush honeysuckle is widespread throughout the campground and was not managed.

Garlic mustard was not detected at the campground for the first time in 2018. This is the result of ongoing management conducted from 2014-2017 (Figure 45).

Japanese barberry is widespread throughout the campground and was not managed.

Oriental bittersweet is present in high abundance throughout the campground but is especially prevalent in a wooded area across from site 13. In total, about 100 plants were removed in 2018, but not all infestations were managed due to their widespread distribution and time constraints.



Winged burning bush was mapped in the woods across from site 13, near the accessible parking, and near the picnic area, but was not managed due to time constraints.

Recommendations:

Garlic mustard should remain the top survey and management priority for this facility. No plants were observed in 2018, following four consecutive years of management. With sustained survey and management resources, garlic mustard can likely be locally eradicated. Additional effort should be dedicated to surveying undeveloped portions of the campground to ensure there are not undetected source populations. Multiple woody invasive plants are present at this facility. With a decline in garlic mustard abundance, management efforts can shit to focus on these species. However, since these species can be spread long distances via bird dispersed seed, reintroduction is likely. Management may result in containment or suppression but is unlikely to result in eradication.

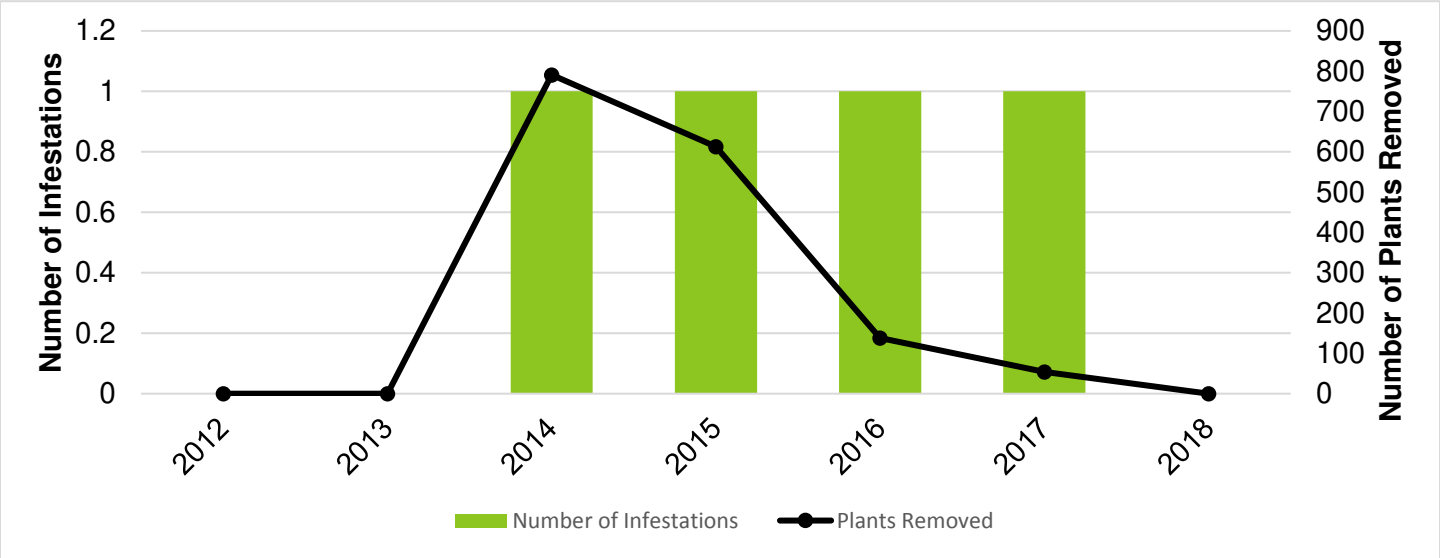


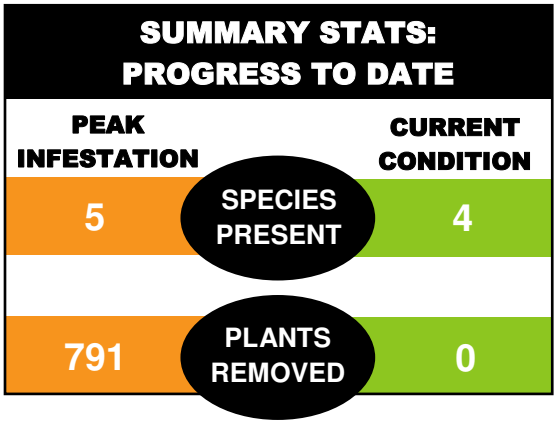
Figure 45. Garlic mustard distribution and management progress at Scaroon Manor Campground.

Rogers Rock

Invasive Species Distribution and Management Overview:

Bush honeysuckle is widespread throughout the campground and was not managed.

Garlic mustard was mapped at sites 6, 7, the bathroom behind site 7, across from sites 7, 9, 11, 17, between site 21 & 22, and along the stream near sites 32, 43, 73, 162, 163, 166A, 167, 169, 182, and 259 (Figure 46). Infestations were not managed because all plants had gone to seed.



Japanese barberry was mapped at site 14 but can be found sporadically throughout the campground.

Wild parsnip was found at the campground for the first time in 2018, located near site 20; however, it had already gone to seed and could not be managed.

Winged burning bush was found at site 223 but plants were too large to be removed mechanically.

Recommendations:

Herbaceous species (garlic mustard and wild parsnip) are the top management priorities for this campground. Both species were not managed in 2018 because they had already gone to seed. This facility should be visited earlier in 2019 to ensure there is adequate time to survey and manage all infestations. Although garlic mustard could not be managed this season, considerable progress has been made in reducing its distribution and abundance. Woody species are widespread throughout the campground and should be addressed only after management of higher priority species is complete. However, since these species can be spread long distances via bird dispersed seed, reintroduction is likely.

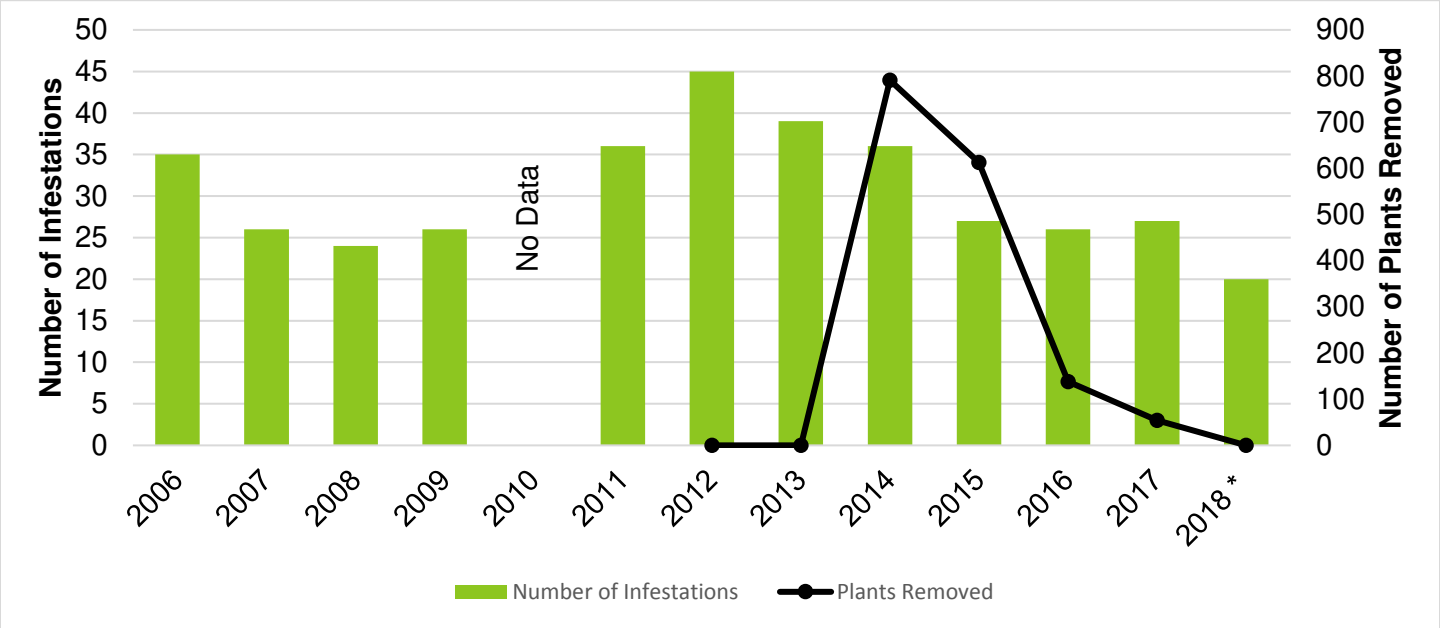


Figure 46. Garlic mustard distribution and management progress at Rogers Rock Campground.

Lake George Islands

Invasive Species Distribution and Management Overview:

This facility was not visited in 2018. A partial inventory was performed in 2007, revealing that purple loosestrife, bush honeysuckle, Japanese barberry, spotted knapweed, and multiflora rose were present at various campsites. Long Island was found to be infested with all five of these species, while Speaker Heck Island was only found to have bush honeysuckle, purple loosestrife, and spotted knapweed. Diamond Island only had bush honeysuckle. A complete inventory of the island should be prioritized for 2019 to assess the distribution and abundance of target species and evaluate management opportunities.

Lake George Islands Campground
Photo Credit: Off on Adventure

Emerald Ash Borer Monitoring

In addition to routine invasive plant surveillance and management activities, the Steward assisted APIPP staff with the deployment and maintenance of emerald ash borer (EAB) detection traps throughout the PRISM. As of 2018, only one infestation of EAB has been confirmed within the Adirondack PRISM – located in northern Franklin County – and there are no known occurrences of EAB within the Adirondack Park boundary. The Steward completed bi-weekly checks and sample collections for five traps distributed throughout the PRISM (Figure 47). Over the course of the season, the Steward collected and preserved 54 insect samples for processing at a later date. Upon follow up inspection by APIPP staff, all samples were found to be free of EAB.

Emerald Ash Borer Trap Locations		
Trap Name/Location	**County**	**Town**
Gulf Brook Rd.	Essex	North Hudson
Northampton Campground	Fulton	Northampton
Perkins Clearing	Hamilton	Lake Pleasant
7th Lake Boat Launch	Hamilton	Inlet
Fernow Forest Trailhead Parking	Franklin	Harrietstown

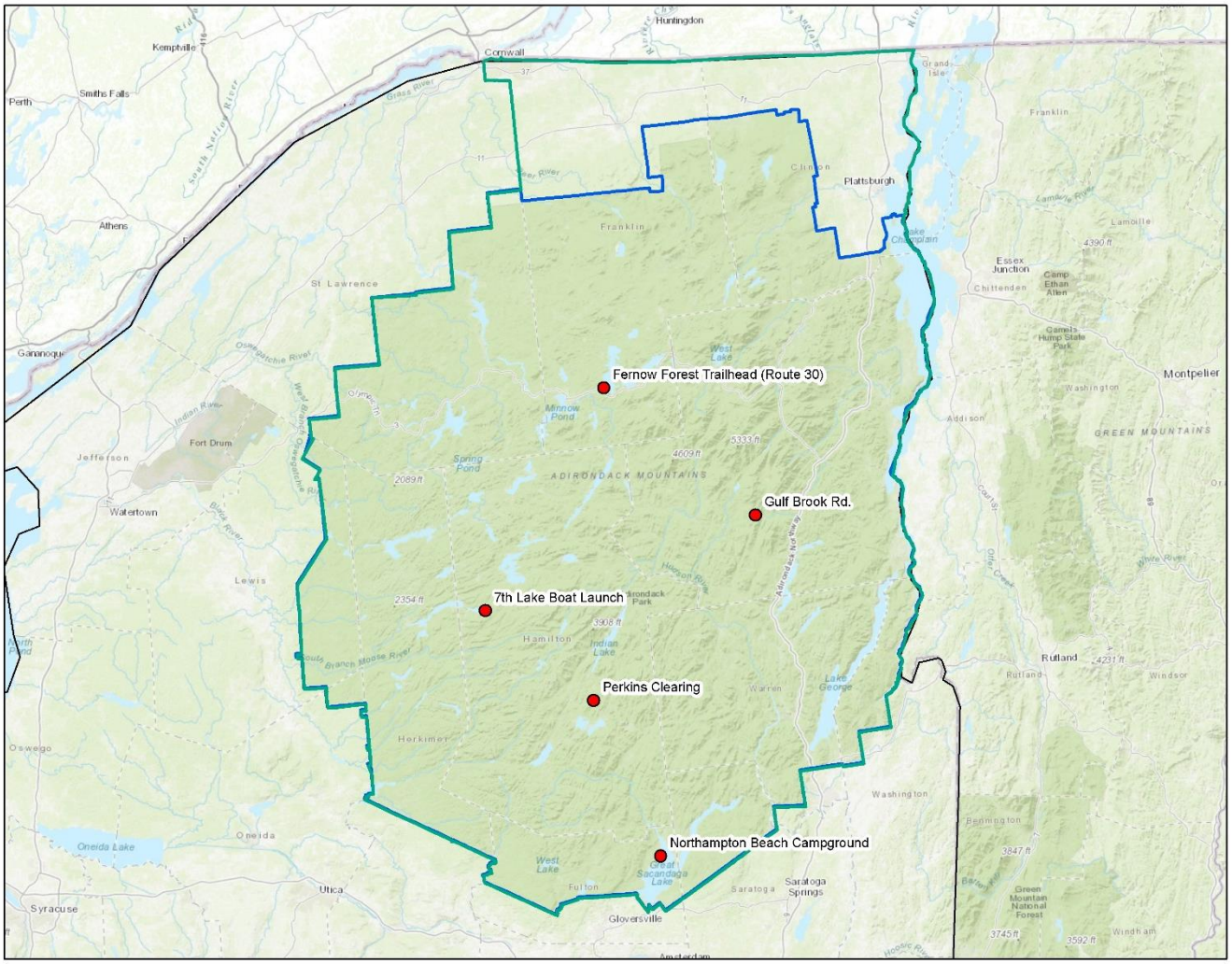


Figure 47. Location of EAB traps monitored by the Steward in 2018.

Conclusion

Under APIPP's direction and supervision, Invasive Species Campground Stewards have achieved significant progress in documenting and managing terrestrial invasive species on DEC administered lands throughout the Adirondack PRISM. The additional seasonal management capacity provided through this position has greatly increased APIPP's ability to reduce and/or eliminate priority invasive plant infestations as well as spread potential by land-based outdoor recreationalists. Since 2012, these Stewards have:

- Surveyed approximately 4,000 acres of DEC land (~571 annually).
- Documented over 1,000 infestations of 17 target terrestrial invasive species.
- Reduced garlic mustard abundance at DEC campgrounds by approximately 90%. In 2018, only 6,502 plants were removed, compared to 68,048 in 2012.
- Eradicated garlic mustard from five campgrounds and documented one or two years of absence at seven additional campgrounds.
- Reduced purple loosestrife abundance at DEC campgrounds by approximately 83%. In 2018, only 858 plants were removed, compared to a peak of 4,956.
- Confirmed the complete absence of APIPP's target terrestrial plant species at eight DEC campgrounds.

Trend analysis suggests that target species distribution and abundance at DEC campgrounds will continue to decline with continued support and advancement of this program. Fourteen campgrounds had significantly reduced levels of garlic mustard in 2018 and are candidates for local eradication over the coming years. An additional six campgrounds had extremely low levels of purple loosestrife that are expected to be locally eradicated over the coming years.

The compelling progress achieved by the Stewards to date should serve as strong justification for continuation of this program. Increases in invasive plant abundance observed following the 2010-2011 funding lapse demonstrate the potential impact of reduced or eliminated programming. APIPP looks forward to building upon program success to maintain the quality of DEC-administered lands and protect the Adirondack region from invasive species impacts.